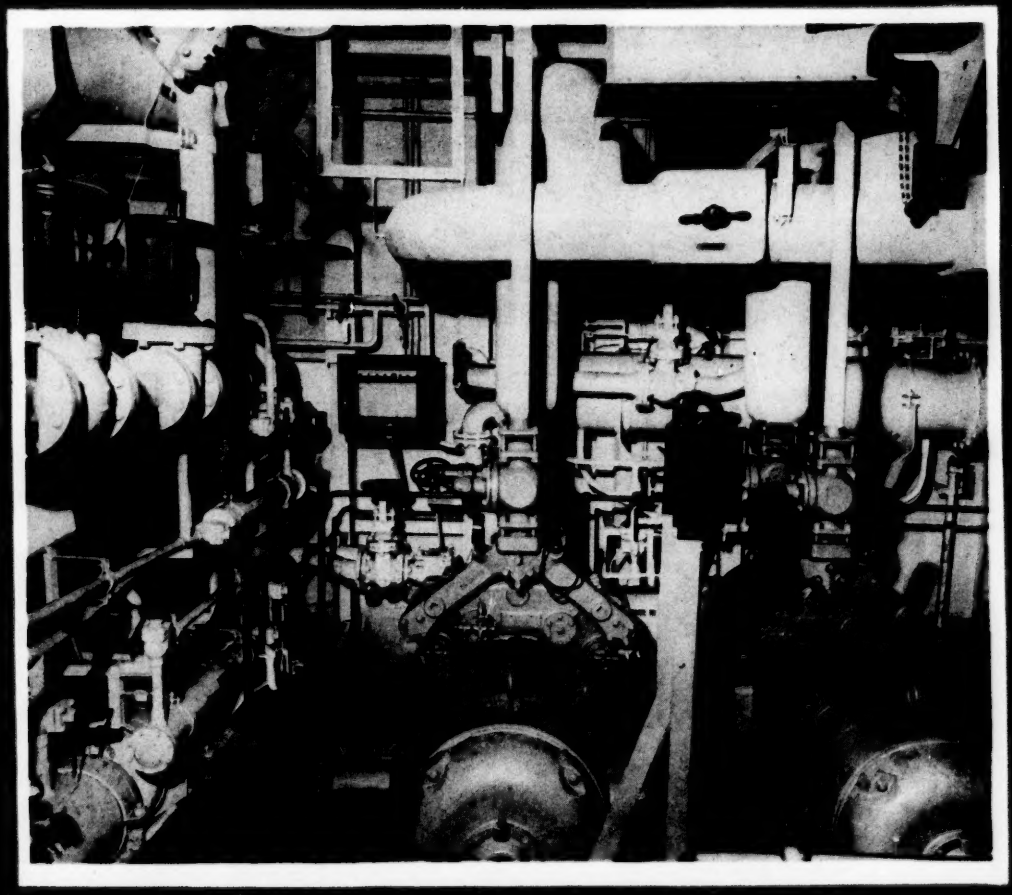
# ICE and REFRIGERATION

THE NATIONAL INDUSTRIAL



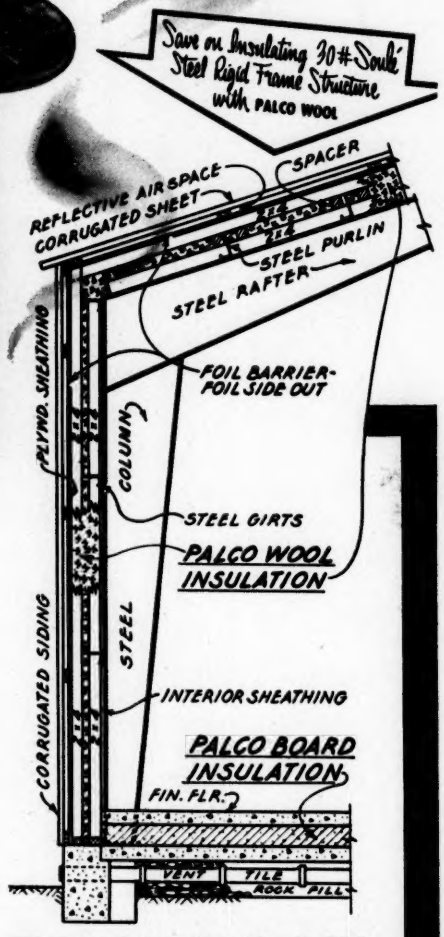
Air Purification for Fruit in Storage . . . Page 13

APRIL • 1953

New Maritime Cargo Vessels Now in Service . . . Page 20

**In planning or estimating low temperature refrigeration...**

# Don't let Profits Vanish in Vapor




## SOLVE THE MOISTURE PROBLEM PERMANENTLY WITH PALCO WOOL Insulation

Vapor trapped as condensed moisture or ice not only reduces efficiency, but actually destroys many insulating materials. Since no vapor barrier is absolutely perfect, Palco Wool solves the moisture problem once and for all, by allowing moisture to migrate freely to the cold side. Because of this, moisture will not "back-soak" in the wall, even though faulty structure forms a vapor dam on the low temperature side. Actually, Palco Wool has lower moisture content after years of use than when originally installed. Peak efficiency is maintained permanently. To keep profits from "vanishing in vapor" investigate Palco Wool Insulation, today.

**Write for free Estimator's Data Sheet No. TW-2 with detail drawing, construction plan, and estimator's cost guide for money-saving application of Palco Wool Insulation in prefabricated steel building. No obligation.**

*Send for Free Sample of* **PALCO WOOL** *for your own inspection*

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- Sanitary hardware

**X-52 PLYWOOD PANEL DOOR**
- Plywood front and back
- Extra heavy-duty hardware
- Special type gaskets

- Maximum insulation fill
- Most possible rigidity
- Allows reversal of swing

**LOW TEMPERATURE DOOR**
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- Extra heavy-duty hardware
- Special type gaskets

**SUPER FREEZER (OVER-LAP) DOOR**
- Extra-heavy construction
- Extra-heavy duty gaskets
- Extra heavy-duty hardware

**VESTIBULE DOOR**
- Save time—labor
- Save refrigeration
- Large plant operation

**TRACK DOOR**
- For abattoirs
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- Banana rooms

**AUTO-CLOSE DOOR**
- For loading dock
- Intra-cooler doors
- Heavy trucking

**DOUBLE DOOR**
- For palletizing
- For carloading
- For elevator shafts

**BUTCHER BOY REFRIGERATOR DOOR CO. • HARVARD, ILL.**

**SLUDGE AND WAX ELIMINATED.** A firm engaged in constructing and servicing industrial refrigeration equipment had constant trouble with compressor oils. Every oil tried lost viscosity excessively under high operating temperatures, vaporized and formed sludge, or formed wax at low temperatures. Complaints were numerous and time lost on call-backs was costly. After consulting compressor manufacturers, the company switched to Suniso. This "Job Proved" refrigeration oil immediately solved all sludge, wax and low temperature problems for this organization.

# SUNISO HELPS INCREASE EFFICIENCY OF 3 REFRIGERATION SYSTEMS

Here are typical examples of how Suniso Refrigeration Oils are helping increase compressor efficiency and are keeping refrigeration system maintenance to a minimum. Following the lead of original equipment manufacturers, more and more maintenance men and refrigeration engineers are safeguarding the efficiency and reliability of their compressors with Suniso.

Suniso Refrigeration Oils meet the requirements of *all* compressors and *all* refrigerants. To get more information, write SUN OIL COMPANY, Phila. 3, Pa., Dept. IR-4

**COMPRESSORS FREE OF SLUDGE AND CARBON** at this large ice cream plant. The oil previously used formed carbon and sludge, the system required special filter handles, and special filtering equipment. Since the change to Suniso, four years ago, operation has been excellent: filters turn freely, oil consumption is down 66%, maintenance 33%.

**SEPARATION TROUBLE ENDED.** In this 15-ton ammonia compressor, the oil discolored badly and failed to separate properly from the refrigerant. Excessive amounts of oil carried over into the separators, lowering the efficiency of the entire system. With a switch to Suniso, separation, carryover and discoloration problems ended.

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# Ice and Refrigeration

VOLUME 124 NUMBER 4



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## *April, 1953*

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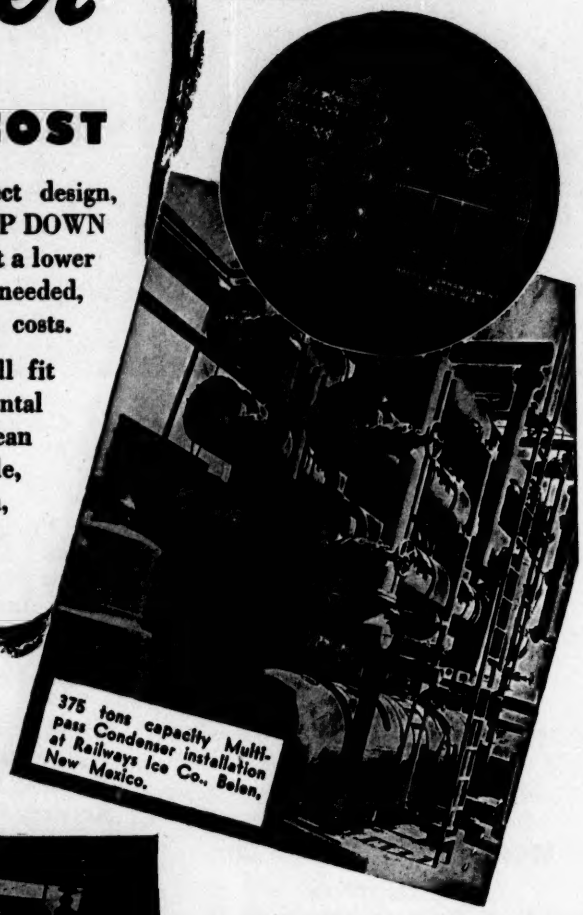
# $ave Power and REFRIGERATION COST

Vogt Condensers, because of their correct design, STEP UP the rate of heat transfer and STEP DOWN head pressures. With the liquid delivered at a lower temperature, smaller compressor capacity is needed, saving in original as well as operating costs.

One of the two basic types illustrated will fit your operations exactly. Install Horizontal Multipass (closed type) for use with clean waters. Where the water is hard, forms scale, contains mud or promotes fungus growth, Vertical Single Pass (film type) which can be cleaned in operation, are recommended.

**Horizontal Multipass Condensers**
(Closed Type)
Water circulated in tubes traverses the length of the unit a number of times as determined by baffles in the heads.



375 tons capacity Multipass Condenser installation at Railways Ice Co., Belen, New Mexico.

**Vertical Single Pass Condensers**
(Film Type)
Patented ferrules give equal distribution of water to and over the surfaces of all tubes in a unit.

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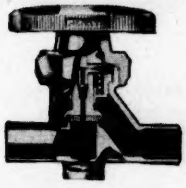
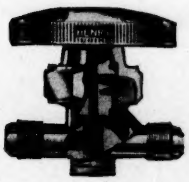
with Exclusive Balanced-Action



**STANDARD TYPE**

Ball check in balancing channel permits diaphragm inspection and replacement with valves under line pressure. Sizes, ¼" thru ⅝" flare; ¼" thru 1⅜" O.D. Solder, ¼" thru 1" F.P.T.



**BLUE BANTAM TYPE**

Same as standard Balanced-Action valve except that diaphragms cannot be inspected or replaced under line pressure. Size ¼" thru ⅝" flare and O.D. Solder.

## PACKED VALVES
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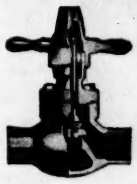
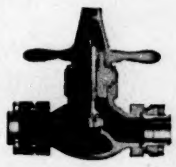


Globe and angle types with solder connections, bolted bonnets, sizes ⅞" thru 5⅛" O.D.

**SEMI-STEEL WING CAP TYPE**

With bolted bonnets and square companion flanges. Furnished with brass tailpieces (O.D. Solder) 1⅜" thru 5⅛" or with steel tailpieces for welding to pipe, sizes 1¼" thru 5".



Also Globe and angle types with F.P.T. connections, sizes ½" thru 2".

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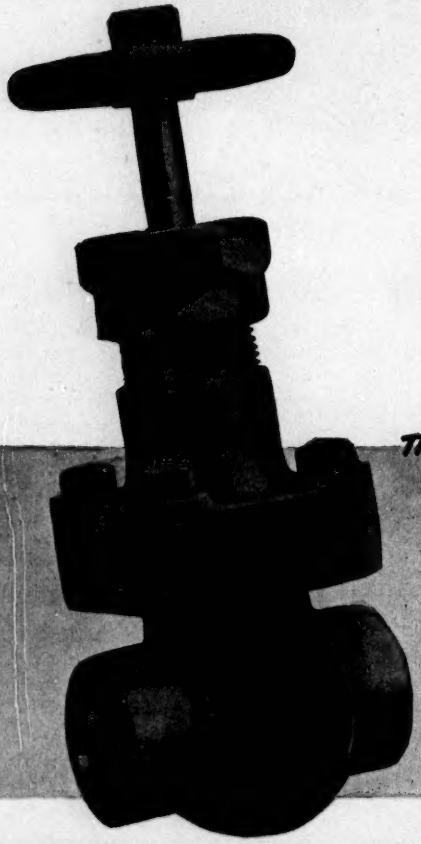

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SUCCESSFULLY market-tested last year, the new Union Iced Sweet Corn Bag has proved its value to the produce industry in protecting the flavor, freshness and appearance of corn from field to consumer.

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Many growers already are familiar with the new Wet Strength Iced Sweet Corn Bag. Others rapidly are becoming acquainted with it through recommendation by government and farm agencies, as well as through Union Bag advertising.

You are a logical supplier not only of the ice needed for these bags—20 lbs. per sack—but also the bags themselves. Get in on the ground floor. Many Ice companies already are sending in substantial orders, to be included in their regular Ice Bag cars.

Easy wire tie fastening • Three layers of sturdy, wet-strength kraft paper • Protection against breakages • Attractive printing on front • Big capacity: 20 lbs. of ice, five dozen ears in 22½" x 34"—7½" bag • Comes printed in green, as illustrated • Ice in bags is reusable. For example, for counter refrigeration • Perforations provide drainage for melted ice water • "Satchel bottom" construction for convenient standing and filling • Guaranteed to cut deterioration and waste.

**FIVE DOZEN EARS OF CORN** are inserted in the bag and 20 lbs. of crushed ice placed on top. The ice is mixed, fine and coarse, for quick cooling and longer-lasting refrigeration.

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*The Sporlan* **LMC** *is* NOT *affected by turbulance... tight closing* IS *assured... there is no current flow through refrigerant... and only proven thermostatic expansion valve performance is employed!*

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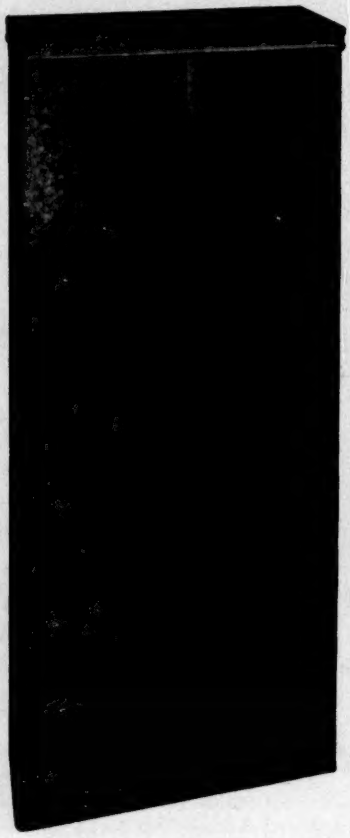

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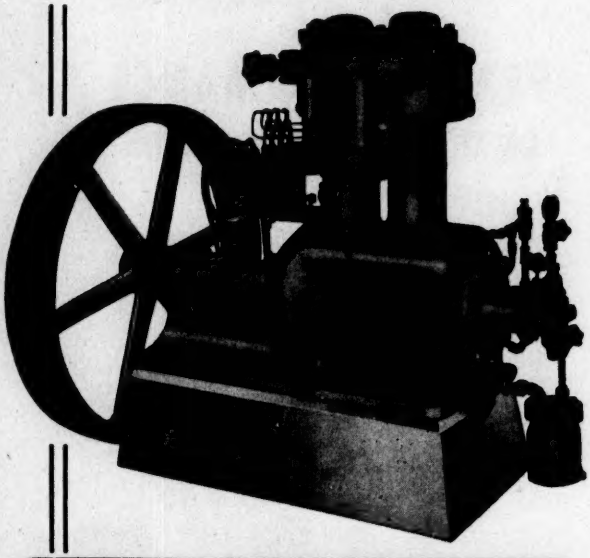

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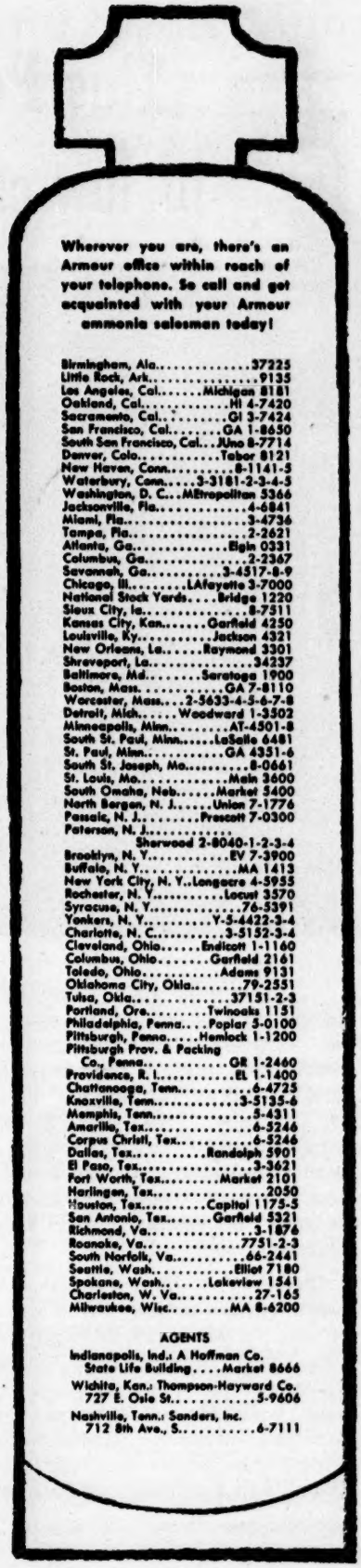

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| New Haven, Conn. | 8-1141-5 |
| Waterbury, Conn. | 3-3181-2-3-4-5 |
| Washington, D. C. | MEtropolitan 5366 |
| Jacksonville, Fla. | 4-6841 |
| Miami, Fla. | 3-4756 |
| Tampa, Fla. | 2-2621 |
| Atlanta, Ga. | Elgin 0331 |
| Columbus, Ga. | 2-2367 |
| Savannah, Ga. | 3-4517-8-9 |
| Chicago, Ill. | LAfayette 3-7000 |
| National Stock Yards | Bridge 1220 |
| Sioux City, Ia. | 8-7511 |
| Kansas City, Kan. | Garfield 4250 |
| Louisville, Ky. | Jackson 4321 |
| New Orleans, La. | Raymond 3301 |
| Shreveport, La. | 34237 |
| Baltimore, Md. | Saratoga 1900 |
| Boston, Mass. | GA 7-8110 |
| Worcester, Mass. | 2-5633-4-5-6-7-8 |
| Detroit, Mich. | Woodward 1-3502 |
| Minneapolis, Minn. | AT-4501-8 |
| South St. Paul, Minn. | LaSalle 6481 |
| St. Paul, Minn. | GA 4331-6 |
| South St. Joseph, Mo. | 8-0661 |
| St. Louis, Mo. | Main 3600 |
| South Omaha, Neb. | Market 5400 |
| North Bergen, N. J. | Union 7-1776 |
| Passaic, N. J. | Prescott 7-0300 |
| Paterson, N. J. | Sherwood 2-8040-1-2-3-4 |
| Brooklyn, N. Y. | EV 7-3900 |
| Buffalo, N. Y. | MA 1413 |
| New York City, N. Y. | Longacre 4-5955 |
| Rochester, N. Y. | Locust 3570 |
| Syracuse, N. Y. | 76-5391 |
| Yonkers, N. Y. | Y-5-4422-3-4 |
| Charlotte, N. C. | 3-5132-3-4 |
| Cleveland, Ohio | Endicott 1-1160 |
| Columbus, Ohio | Garfield 2161 |
| Toledo, Ohio | Adams 9131 |
| Oklahoma City, Okla. | 79-2551 |
| Tulsa, Okla. | 37151-2-3 |
| Portland, Ore. | Twinoaks 1151 |
| Philadelphia, Penna. | Poplar 5-0100 |
| Pittsburgh, Penna. | Hemlock 1-1200 |
| Pittsburgh Prov. & Packing Co., Penna. | GR 1-2460 |
| Providence, R. I. | EL 1-1400 |
| Chattanooga, Tenn. | 6-4725 |
| Knoxville, Tenn. | 3-5135-6 |
| Memphis, Tenn. | 5-4311 |
| Amarillo, Tex. | 6-5266 |
| Corpus Christi, Tex. | 6-5266 |
| Dallas, Tex. | Randolph 5901 |
| El Paso, Tex. | 3-3621 |
| Fort Worth, Tex. | Market 2101 |
| Harlingen, Tex. | 2050 |
| Houston, Tex. | Capitol 1175-5 |
| San Antonio, Tex. | Garfield 5321 |
| Richmond, Va. | 3-1876 |
| Roanoke, Va. | 7751-2-3 |
| South Norfolk, Va. | 66-2441 |
| Seattle, Wash. | Elliot 7180 |
| Spokane, Wash. | Lakeview 1541 |
| Charleston, W. Va. | 27-165 |
| Milwaukee, Wisc. | MA 8-6200 |

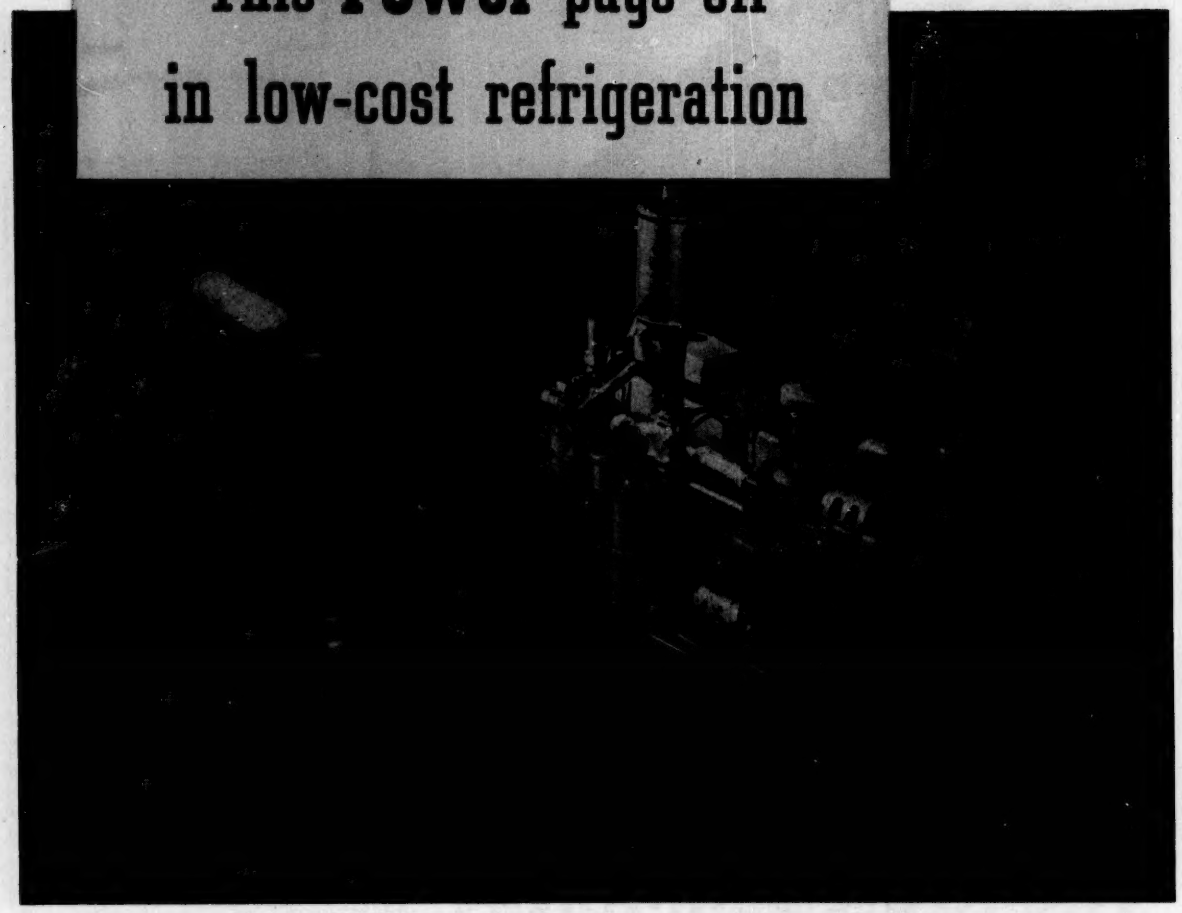
**AGENTS**

Indianapolis, Ind.: A Hoffman Co. State Life Building . . . . Market 8666

Wichita, Kan.: Thompson-Hayward Co. 727 E. Osie St. . . . . 5-9606

Nashville, Tenn.: Sanders, Inc. 712 8th Ave., S. . . . . 6-7111

# This Power pays off in low-cost refrigeration



Three Caterpillar Diesel Engines provide the Neosho Ice Co., Neosho, Missouri, with the steady, low-cost power necessary for profitable operation. A D8800 drives an 8" x 8" Frick refrigeration compressor for an output of 43.6 tons per day. With two other Cat Diesels, a D11000 and a D4400, the plant has a capacity of 60 tons of ice daily, has 216,000 cu. ft. of cold storage and one 15,000-ton ice storage room. The engines work 24 hours a day, every day in the week, six months a year. Products are block and crushed ice.

Owner R. A. Haas changed over to Caterpillar Diesels because he figured they'd save almost $3,500 per year for him. They're engineered to cut power costs. They burn low-cost No. 2 furnace fuel without fouling, and they need very little attention or service. In fact, in 4,320 hours of operation, the D8800 required no repairs whatsoever. That's not surprising. These sturdy yellow engines are built to work day-in and day-out with a minimum of down-time. If you have to call for service, your Caterpillar Dealer is on the spot fast.

Any way you look at them, Cat Diesels are a sound investment. And they're worth a good look. They've cut power costs for others—they can for you. Let your Caterpillar Dealer show you how. You'll get facts—not "blue-sky" talk—because he knows his business. Engines are available up to 500 HP—electric sets, up to 315 KW.

CATERPILLAR, PEORIA, ILLINOIS

**CATERPILLAR**

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**Diesel Electric Sets**

# In the Spotlight

**AIR PURIFICATION** seems of doubtful economic value in well operated commercial fruit warehouses, according to an investigation by The United States Department of Agriculture at Wenatchee, Wash. This investigation and its results are reported in full in the article starting on page 15.

**NEW MARITIME** Cargo vessels have been put in service by U. S. Maritime Administration with identical capacity and installations, four refrigerated compartments and ship service refrigerators. For description and pictures see page 20.

**TO PROVIDE** ice service for refrigerator cars moving out of the packing plant of The American Stores Company at Pueblo, Colo., ice is made in usable sizes in freezers and then transferred to refrigerator cars with a specially designed ice handling and loading system. See story and pictures on page 25.

**A PANEL** Discussion covering mutual problems of the frozen food and warehousing industries was held by representative members of both groups in connection with the annual frozen foods convention. Report of meeting is covered in article on page 32.

**MANY ADVANCE** registrations are already in for the annual AWA-NARW Convention to be held May 17-21. Program planning is in full swing with emphasis on subjects of practical value. For additional details see article on page 31.

**A MODERNIZATION** program has been completed by the Minneapolis Cold Storage Company which will add 375,000 cubic feet of freezer space to the present capacity. See page 33.

**COVER PICTURE: Cargo refrigerating machinery installed in USS Lone Star Mariner showing electric-dynamo motors, indicating and recording devices, heat exchanger, condensers, receivers and dehydrators for Cargo refrigerating systems. For full description see article starting on page 20.**

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**PUBLIC COOLER** space on February 28 was up one point and freezer space was down three points compared to last year, according to monthly report of the Department of Agriculture. See page 35.

**BLOWER COIL** design and selection for proper humidity control was discussed in a paper presented at the recent NAPRE Convention. The author pointed aut that humidity within a refrigerated space depends upon the balance between rate of removal and rate of supply of moisture. Charts and pictures helped to tell the story. The paper is published in full starting on page 37.

**THE ANNUAL** National Frozen Foods Convention was held at the Conrad Hilton Hotel, Chicago, the week of March 2, sponsored by the National Association of Frozen Food Packers. Important phases of the industry were included in addresses and panel discussions. For report of the convention, see page 46.

**UNIT ICE** Associations continue an active program of annual conventions and other meetings. Annual conventions of the Michigan and North Carolina associations, an engineering conference in Florida, and regional meetings of Delta States association, are reported in the section starting on page 27.

# 60 Years Ago

*From the April, 1893 issue of* ICE AND REFRIGERATION

**A TRADE CIRCULAR** is quoted as stating that a commission house had in store a quantity of Willow Twig apples of the crop of 1891, grown in Iowa, which were in good condition. This if true rather upsets the theory of some apple men that fruit cannot be held in cold storage beyond a limited period. We have been unable to locate this lot of apples, but we are inclined to think the difficulties in keeping apples and most other fruit will eventually be reduced when further experience will have increased the available data respecting the conditions necessary to fit the case.

**A SERIES OF ARTICLES** on the absorption machine, interrupted by illness of the author, John E. Starr, was resumed in this issue. In this contribution, Mr. Starr presents some pertinent information on relation of pressure and temperature of ammonia in solution with water. Data on this with aqua ammonia of various strengths as determined by his own experiments are given in tables.

**ICE PRICES** for 1893, obtained by a survey of all sections of the country were low, and this was to be expected, it was stated, due to the abundant crop harvested. However they appear to be such as will give a margin of profit at the end of the season. As a means of avoiding price cutting it is suggested that dealers adopt the methods of the ice exchanges and board of trade, as in Pittsburgh and Troy, N. Y., where the dealers get together, adopt a price list, fair alike to them and their trade and then stick to the list. Sample prices for 100 pounds domestic delivered are: Huntsville, Ala., 50 cents; San Francisco, Calif., 50 cents; Pueblo, Colo., 60 cents; Chicago, Ill., 40 cents.

(NOTE: As is well known, such an agreement now would conflict with federal laws.)

**THE FLORIDA ICE** Manufacturers Association held an annual convention at Ocala. A resolution was passed calling attention to exorbitant prices for ice charged by certain parties who were not members of the association, under cover of the policy of the association to divide trade territories. The convention declared its purpose to use all honorable means to prevent outside parties from charging exorbitant prices in all parts of the state.

# New one-story U.S. Cold Storage Plant uses Carrier Ammonia Refrigeration

If you were to stick a pin in the geographical center of the United States you would come close to hitting one of the nation's newest cold storage warehouses. It's in Omaha and it was built by the U. S. Cold Storage Corporation — their seventh refrigerated warehouse.

All U. S. Cold Storage's years of experience went into the scientific planning of this 7-acre plant. Everything is on one floor and the movement of the 25 million pounds of food they can store is speeded by the use of fork-lift trucks that can handle a ton at a time.

U. S. Cold Storage's years of experience influenced the selection of the refrigeration, too. They chose Carrier Ammonia Compressors for the high stage of their two-stage system and they installed them in multiple for greater flexibility. Carrier's long experience and improved design gave them the reliability and efficiency they wanted.

This Omaha plant has 76,500 square feet of freezer space plus 27,500 square feet of convertible freezer or cooler space, enabling them to freeze 300,000 pounds of food a day. With all this food at stake, they needed refrigeration that was reliable, flexible, and efficient.

Whatever your refrigeration problem, you'll find equipment best suited to your needs in Carrier's full line of Ammonia Compressors, Cold Diffusers, and Evaporative Condensers. For complete information write Carrier Corporation, Syracuse, New York.

Carrier

AMMONIA

REFRIGERATING EQUIPMENT

Pictured here are some of the Carrier Ammonia Compressors at the new Omaha Plant. These are used as high-stage compressors of a two-stage system for obtaining low temperatures. In the plant's six blast freezer rooms, Carrier coils help keep temperatures as low as 40 degrees below zero.

# AIR PURIFICATION FOR FRUIT

***Tests by U.S. Dept. of Agriculture on air purification in the cold storage of fruit indicate that its economic value in well operated commercial fruit storages seems doubtful.***

**By Fisk Gerhardt, G. F. Sainsbury, and H. W. Siegelman, Bureau of Plant Industry, Soils and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture, Wenatchee, Wash.**

## Introduction

AIR PURIFICATION of fruit storages has been under continuous investigation by the U. S. Department of Agriculture at Wenatchee, Washington, since 1948. Earlier work by Smock and Southwick[7] had indicated that air purification with activated coconut-shell carbon partially removed ethylene from the storage air, increased the storage life of apples by three to four weeks, controlled apple scald to about the same extent as oiled paper, and removed objectionable odors from fruit storages. Considerable commercial interest and installation of air purification equipment in some commercial storages followed. Claims from some storage operators and equipment salesmen have intimated that air purification is a necessary adjunct to modern cold storage practice.

Studies by Gerhardt[3], Gerhardt and Sainsbury[4], by Fidler[2] in England, and by Trout[11] in Australia have not confirmed some of the original findings. Activated coconut-shell carbon was found ineffective in the removal of ethylene from fruit storage, and it failed to prolong significantly the storage life of apples and pears. Activated carbon did not give control of apple scald equal to that afforded by oiled paper wraps; it did, however, reduce to a marked degree the concentration of non-ethylenic odors in fruit storage.

It has been suggested[5,6] that the failure to obtain more favorable results in the air purification work at the Wenatchee laboratory was due to the temperatures and handling methods used, which were not those known to be best for apples. A storage temperature of 35 F was chosen in our first work[3] to accentuate atmospheric differences between the test rooms, since production of fruit volatiles is much greater at 35 F than at 31 F.

In addition to experimental fruit, filler stock of variable maturity and condition was used to simulate commercial practice. Optimum fruit handling and storage procedure, including varietal segregation, still remains a generally unattained commercial objective. Our experimental studies of air purification, to date, have been based on commercial rather than ideal storage practice. We have made two exceptions in that our ratio of carbon to fruit and our carbon replenishment have always been many times as great as those recommended for commercial installation.

This paper presents data obtained in 1952 on the value of air purification of fruit storages under optimum conditions of fruit maturity and handling and refined control of atmosphere and temperature. Three conditions relative to fruit volatiles in the storage air were rigidly maintained in three comparable lots of fruit at 31 F. Air purification through brominated and activated coconut-shell carbon made this feasible.

One atmosphere carried a high level of *both* ethylene and non-ethylenic volatiles (comparable with some commercial storages); the second was *high* in ethylene but *low* in the non-ethylenic group; and the third carried only trace amounts of all types of fruit volatiles. The storage life of the various lots of fruit was compared in terms of firmness, respiratory activity, breakdown, soluble pectin content, and dessert quality. The control of storage scald by oiled paper wraps and air purification was also studied.

## Materials and Methods

*Experimental storage cabinets:* Fig. 1 is a schematic drawing of one of the three sheet metal chambers of approximately 45 cu ft capacity used to maintain the desired atmospheres for the test fruit. Each cabinet contained a centrifugal air circulating fan (D) that drew air from the top of the cabinet and discharged it through a 2-inch round duct (E) into a plenum space between the bottom of the steel cabinet and a perforated plywood floor (G) in the cabinet. Air was discharged upward between stacks of boxes through rows of ¼-inch holes (F) arranged to conform to the pattern of spaces between stacks.

In the check cabinet the air was not filtered as it was circulated, but the other two cabinets were each equipped with one air purification canister as illustrated. In one case brominated carbon was used and in the other activated carbon. Within each cabinet air was recirculated through the canister at the rate of 30 to 40 cu ft per min, which is equivalent to approximately 40 to 55 air passages per hour. The relative amount of carbon (1.5 lb per 15 bu fruit) and the number of hourly air passages through the carbon were far greater than those normally recommended for commercial installation.

Fifteen boxes of test fruit (J) were placed in each cabinet in the manner illustrated, with spaces between all stacks and between stacks and side walls. Air velocities between stacks averaged 30 to 50 ft per min.

## Cabinet Covers

The covers of the cabinets consisted of two portions, one a normally fixed section (A) from which was suspended the circulating fan and purification canister assembly (D) and the light bulb (B) installed inside as a heat source for temperature adjustment. This cover contained the ventilation air inlet (C) and sleeves (M), one for the passage of thermocouple lead wires and the other (not shown) for power wiring to the light and fan motor. The normally removable portion of the cover (L) contained only the ventilation air outlet (K). Access for removal of fruit and renewal of the canister at various times during the season was through this section. Rubber gaskets sealed with gasket cement were placed on the flanges around the top of the cabinets and the cover plates were pulled down on the gasket by cap screws located at 4-inch intervals around the periphery of the cover plates.

The cabinets, located in a small storage room in the Wenatchee, Washington, laboratory, were ar-

ranged with adequate spacing from the wall and separated from direct contact with the floor by 2 x 2 spacer strips (H).

A 60 watt light bulb was placed in each cabinet and wired in series with a bulb on the outside of the cabinet. By changing the wattage of the outside globe, the circuit resistance could be altered and the heating effect in an individual cabinet controlled to balance differences in cabinet temperatures.

Cooling of the cabinets was affected by the ventilation air and by conduction through the galvanized steel walls of the cabinet. To obtain fruit temperatures of 31 to 32 F it was necessary to maintain an average room temperature of 28 to 29 F. Baffling the air from the room cooling unit proved a more satisfactory means of temperature control than varying the resistance in the light circuits; it also had the advantage of operation with the addition of a minimum of extra heat to the cabinets.

Thermocouples were placed in center fruit of a bottom and a top box in each cabinet. Leads to the outside were provided for intermittent reading with a manually balanced semi-precision potentiometer in order to check the uniformity of temperature conditions in the three cabinets.

Metered amounts of outside air were drawn through the cabinet openings (C and K); quantities of the ventilation air were varied in the different chambers in order to maintain a uniform concentration of approximately 0.5 per cent $CO^2$ in each cabinet.

"Columbia" Grade AC 6/14-mesh coconut-shell carbon from Carbide & Carbon Chemicals Co. was used. The brominated carbon was prepared by adding 20 per cent by weight of C. P. bromine to the plain activated carbon. A single canister in each cabinet carried 1.5 lb. of either brominated or activated carbon per 15 bu. of fruit. The metal surface of the brominated canister was protected from corrosion by a plastic screen and a thin layer of activated carbon, which also served to trap any possible trace of free bromine from the brominated carbon.

*Analysis of Storage Atmospheres:* Air samples, at a rate of 30 liters per hour, were withdrawn from each of the three storage cabinets at intervals and passed through a series of two Truog towers. The first tower contained 30 ml of C.P. sulphuric acid for the entrapment of non-ethylenic volatiles and the second 30 ml of a 60 per cent perchloric solution containing five per cent red mercuric oxide for the absorption of ethylene. After cerate oxidimetry, ethylene and other volatiles were expressed as milligrams of ethylene and milligrame of $Ce(SO_4)_2$ reduced per cubic foot of air, respectively.

The $CO_2$ levels in the experimental chambers were determined by the passage of measured amounts of air at the rate of 30 liters per hour through sintered glass bubblers in absorption cylinders carrying standard NaOH. Carbon dioxide was expressed as per cent $CO_2$ in the storage air.

*Experimental Fruit and the Handling Procedure:* Anjou pears and Red Delicious, Golden Delicious, and Rome Beauty apples were used. All varieties were harvested at an early commercial maturity. Anjou pears were picked on September 17, Golden Delicious apples on October 8, Rome Beauty apples on October 5, and Red Delicious for storage scald studies on September 21 and for storage quality on October 2, 1951. Carbon dioxide measurements at harvest indicated that all lots of fruit were in their so-called preclimacteric stage of respiration; therefore, these fruits should have been susceptible to stimulation of ripening by volatiles in their storage environment.

All varieties of fruit were placed at 31 F the day of harvest. Apples and pears designated for quality and condition studies were packed unwrapped in standard wooden apple boxes. In the storage scald studies, half of each

*Fig. 1 (below)—A schematic drawing of one of the experimental storage cabinets. (See text for explanation of letters.)*

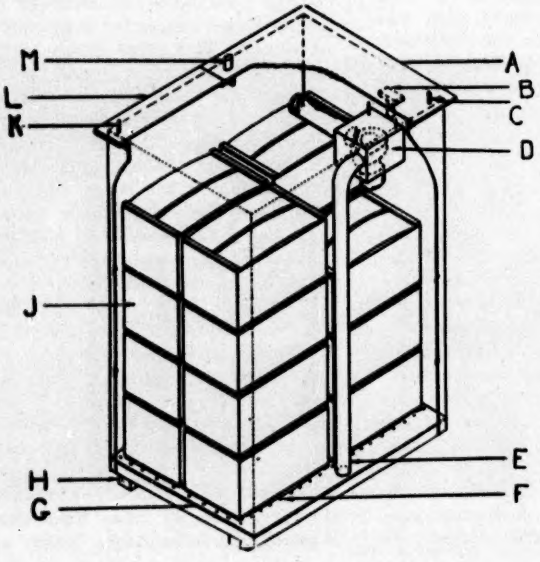
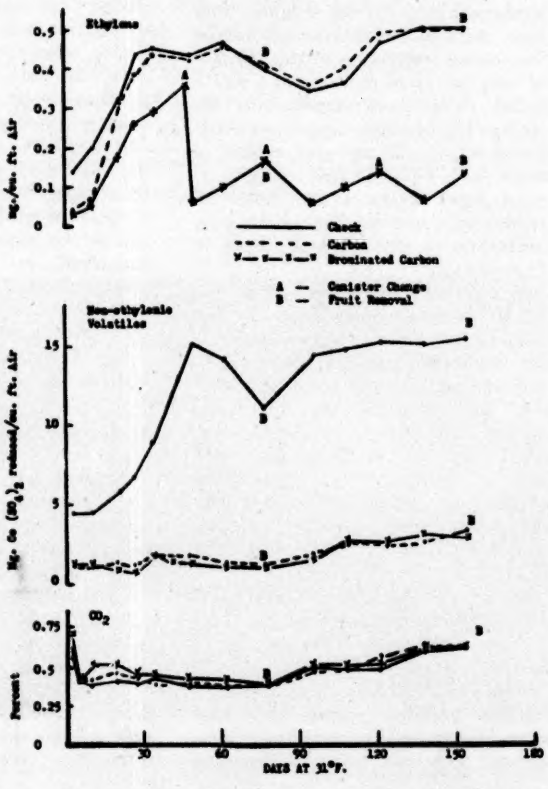



*Fig. 2 (right)—Composition of the atmosphere in the various storage chambers.*



standard box was packed with unwrapped fruit and the other half with comparable fruit in fresh commercial oiled fruit wraps.

The three storage chambers at 31 F were loaded with test fruit on October 11, 1951. Each chamber contained 15 packed boxes of fruit (580 lb.): three packed boxes each of Anjou pears, Red Delicious apples, and Golden Delicious apples for quality and condition studies and two packed boxes each of Anjou pears, Red Delicious, and Rome Beauty apples for the storage scald work.

*Evaluation of Condition and Dessert Quality:* Measurements of firmness, soluble pectin, and respiration along with organoleptic tests were used to study the response of the fruit to air purification. Firmness was measured with the Magness-Taylor pressure tester; soluble pectin was determined (as per cent calcium pectate) in 100 gm of fresh tissue macerated in a Waring Blender according to unpublished methods of the Wenatchee Station. Respiration values were obtained by absorption of the $CO_2$ from tared fruits in standard NaOH, precipitation of the carbonate with $BaCl_2$ and titration with 0.3 N HCl. Carbon dioxide values are expressed as milligrams of $CO_2$ per kilogram per hour. Aeration during absorption was at the rate of 30 liters per hour of $CO_2$ free air.

A taste panel of 4 to 25 members evaluated the appearance, condition, and dessert quality of the experimental fruit. The 25 man panel made the general evaluation at the end of the test.

## Results

*Atmospheric Concentration of Fruit Volatiles in Storage Cabinets:* As stated previously, three storage chambers were used to establish atmospheres of varying concentrations of fruit volatiles. Each cabinet received supplemental ventilation to achieve this end and to equilibrate the $CO_2$ concentration to approximately 0.5 per cent. Data in Fig. 2 indicates the success of this venture. In the check cabinet (simulative of some commercial apple storages) ethylene and non-ethylenic volatiles both were present in relatively great concentrations, approximately 0.5 and 15 mg per cu ft of air, respectively. The fruity odor was readily detected by smell.

Ethylene concentrations in the cabinet containing activated carbon were similar to those in the check cabinet. This indicated again[4] that activated carbon was ineffective in the removal of ethylene. The fruity non-ethylenic volatiles, however, were almost completely removed (down to 2.5 mg.) by both brominated and non-brominated charcoal. Fig. 2 shows that by replenishment of the brominated carbon at intervals of 30 days, all fruit volatiles in this cabinet were almost completely removed. With 1.5 lbs. of this carbon per 15 bu of fruit and with a replenishment program of once a month, it is very evident that ethylene removal in commercial apple storages could never become feasible. It appears that the capacity of the brominated carbon to adsorb ethylene is exhausted rapidly.

Data in Fig. 2 indicate that the level of $CO_2$ in all three cabinets was successfully maintained at about 0.5 per cent throughout the entire storage period. In fact, all of the desired levels of the various fruit volatiles in each storage chamber were maintained with an accuracy much greater than possible in any commercial air purification installations studied by the authors.

### Physiological Changes in Fruit

Apples and pears were removed, from their various storage atmospheres in January and again in March, for a comparative study of their firmness, soluble pectin content, and respiratory activity as influenced by their storage environment. These physiological determinations along with organoleptic tests were used to evaluate the storage and dessert condition of the test fruit.

Data in Table 1 shows that at the January sampling, air purification with activated carbon had no measurable effect on the firmness and soluble pectin content of apples and pears. Visual examination also established no differences. This was true even when brominated carbon was used and ethylene and other volatiles were present only in trace amounts. In March, Anjou pears and to a less degree, Golden Delicious apples in the brominated carbon chamber were riper than in the control cabinet. These lots were less firm and possessed more soluble pectin.

Why brominated carbon with no apparent residual free bromine odor should stimulate ripening is not known. Temperatures in all cabinets were maintained within 1 F. Anjou pears direct from the brominated carbon chamber at 31 F were definitely light green and rather juicy whereas controls were dark green and firm.

Respiration measurements in January also indicated that there was no significant difference in the degree of ripeness of the test fruit as related to air purification (Table 2). By March, however, respiratory values were greater again in pears stored in the brominated carbon chamber, while those in the activated carbon and the control cabinets were similar. Both visual inspection and biochemical analyses indicate that the storage life of the fruit was not enhanced by air purification of the storage atmosphere in which it was stored.

### Dessert Quality of Test Fruit

Red Delicious and Golden Delicious apples and Anjou pears from the

TABLE 1.—FIRMNESS AND SOLUBLE PECTIN CONTENT OF APPLES AND PEARS AT 31F AS INFLUENCED BY VARIOUS KINDS OF AIR PURIFICATION, 1952

| Variety | Kind of Air Purification | Fruit removed from cabinet Jan. 7 Firmness Lbs. | Fruit removed from cabinet Jan. 7 Soluble Pectin Per Cent | Fruit removed from cabinet Mar. 17 Firmness Lbs. | Fruit removed from cabinet Mar. 17 Soluble Pectin Per Cent |
|---|---|---|---|---|---|
| Red Delicious Apple[1] | None | 14.2 | 0.061 | 12.6 | 0.078 |
| | Activated Carbon | 13.4 | .076 | 12.3 | .079 |
| | Brominated Carbon | 13.2 | .075 | 12.0 | .083 |
| Golden Delicious Apple[2] | None | 11.2 | .154 | 10.7 | .172 |
| | Activated Carbon | 10.9 | .164 | 10.8 | .175 |
| | Brominated Carbon | 10.9 | .168 | 9.9 | .189 |
| Anjou Pear[3] | None | 9.9 | .129 | 7.2 | .137 |
| | Activated Carbon | 9.6 | .139 | 7.6 | .155 |
| | Brominated Carbon | 9.8 | .134 | 6.0 | .288 |

[1]Harvested October 2, 1951 at 15.7 lbs and 0.046 percent soluble pectin.
[2]Harvested October 8, 1951 at 15.3 lbs and 0.047 percent soluble pectin.
[3]Harvested September 17, 1951 at 10.9 lbs and 0.1250 percent soluble pectin.

TABLE 2.—RESPIRATION (MG. $CO_2$ PER KG/HR) OF APPLES AND PEARS STORED UNDER VARIOUS CONDITIONS OF AIR PURIFICATION, 1952

| Variety | Kind of Air Purification | Respiration of fruit removed from cabinet Jan. 7 and held at 65 F for indicated number of days | | | | | | | Respiration of fruit removed from cabinet Mar. 17 and held at 65 F for indicated number of days | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 3 | 5 | 7 | 9 | 11 | 13 | 1 | 3 | 5 | 7 | 9 | 13 |
| | | Mg | Mg | Mg | Mg | Mg | Mg | Mg | Mg | Mg | Mg | Mg | Mg | Mg |
| Red Delicious Apple | None | 28.2 | 27.4 | 27.7 | 26.1 | 25.8 | 25.7 | 23.1 | 26.7 | 30.3 | 30.1 | 29.3 | 28.2 | 26.4 |
| | Activated Carbon | 27.7 | 27.7 | 26.6 | 26.1 | 25.3 | 25.8 | 22.6 | 26.3 | 29.0 | 28.2 | 27.9 | 27.9 | 25.6 |
| | Brominated Carbon | 27.5 | 27.6 | 27.2 | 25.5 | 25.0 | 24.5 | 21.9 | 29.1 | 32.0 | 29.9 | 28.4 | 27.5 | 25.4 |
| Golden Delicious Apple | None | 33.2 | 32.1 | 32.2 | 31.0 | 30.3 | 30.2 | 25.8 | 31.2 | 31.9 | 30.1 | 30.5 | 30.4 | 28.7 |
| | Activated Carbon | 32.1 | 32.1 | 32.1 | 30.9 | 30.6 | 30.2 | 25.6 | 31.4 | 31.4 | 30.6 | 30.3 | 30.0 | 28.1 |
| | Brominated Carbon | 33.0 | 32.1 | 32.1 | 30.9 | 30.3 | 29.8 | 26.1 | 33.2 | 33.3 | 33.4 | 33.8 | 31.9 | 29.9 |
| Anjou Pear | None | 22.2 | 22.0 | 26.1 | 31.0 | 36.0 | 36.3 | 31.0 | 26.8 | 32.4 | 35.0 | 35.0 | 34.8 | 33.3 |
| | Activated Carbon | 21.8 | 22.0 | 27.5 | 32.0 | 37.0 | 36.0 | 30.0 | 28.1 | 33.0 | 36.2 | 36.3 | 35.8 | 34.3 |
| | Brominated Carbon | 22.1 | 21.7 | 27.5 | 33.2 | 36.8 | 37.2 | 31.4 | 32.3 | 38.3 | 41.8 | 37.1 | 36.0 | 34.7 |

various storage chambers were examined for their dessert quality on March 24, 1952. Two bushels of each variety were used in sampling; one lot was representative of fruit ripened for one week at 65 F and the other of fruit immediately after withdrawal from 31 F storage. All samples were coded and a group of 25 qualified fruit men constituted the judging panel. A numerical scale of dessert quality evaluation was not used, and free discussion between panel members occurred during cutting and sampling.

## Texture and Flavor

A poll of the taste panel revealed that 21 of the 25 members failed to detect any significant difference in the texture and flavor of the fruit from the various storage chambers. Four favored fruit from the cabinets whose air had been purified by passage through activated or brominated carbon. These four indicated that a stronger and a more aromatic flavor was present in the fruit from the control (high level of volatiles) than in that from the air purified chambers. Detection of flavor differences by the four members was much more pronounced in fruit directly from cold storage than in the ripened lots. Of the four judges who expressed a preference only two were able to recognize the more advanced ripeness of the Anjou pears from the brominated carbon chamber.

The authors were in the group of 21 individuals who were initially unable to distinguish differences in the flavor of the various lots of test fruit; after working closely with the two members of the panel who had definite taste preferences, the authors were impressed with the latitude in taste preference between individuals. Honest difference of opinion will always exist in this field of flavor preference and dessert quality evaluation. In this instance the degree of varietal flavor became the important factor in question.

The minority of the panel were searching for and preferred a mild to almost neutral flavor, while the majority of tasters were less concerned with the strength of the varietal flavor and were more concerned with texture and the detection of any abnormal flavors. Since 21 of the 25 qualified fruit men comprising the panel failed to detect any significant benefit in condition and dessert quality of the fruit as a result of air purification of the storage atmosphere, the economic value of air purification in well-operated commercial fruit storages seems doubtful. In these tests the volatile levels of fruit stored without carbon were unusually high.

### Storage Scald and Breakdown As Related to Air Purification

Comparable lots of Red Delicious and Rome Beauty apples and Anjou pears, packaged with and without oil paper wraps, were stored in each of the experimental cabinets. Data relative to the development of storage scald in the various storage atmospheres are given in Table 3.

All three varieties of fruit were selected for predisposition to the development of storage scald. Air purification with activated carbon failed to reduce the intensity of this storage disorder. Brominated carbon reduced very slightly the severity on Rome Beauty apples and Anjou pears. Storage scald was controlled much more effectively by oiled fruit wraps than by either method of air purification of the storage atmosphere.

The amount of internal breakdown developed in fruit during prolonged ripening has often been used as an indication of its residual storage life. Data in Table 3 shows a similar amount of breakdown for lots of fruit previously stored in atmospheres with and without activated carbon air purification. The data on internal breakdown further confirms earlier observation that brominated carbon hastened the ripening of Anjou pears during regular cold storage.

## Discussion

The results of air purification in these tests conducted under almost ideal conditions of fruit maturity and storage are similar to those obtained from our earlier experiments conducted under less favorable conditions. Most apples and pears grown in the Pacific Northwest can be stored successfully under present good handling and refrigeration practice. If air purification is justified, except for odor removal, it must improve the dessert and keeping quality of the fruit enough to be readily recognized by the fruit trade and by the ultimate consumer. In other words, air purification must pay its own way. Conflicting results obtained by trained investigators raise serious doubt that it has accomplished this objective.

Failure of activated carbon to remove ethylene from the storage air is now recognized by most investigators [1,2,4,5,9]. Any apparent benefit to fruit condition from the use of activated carbon must therefore ignore the role of ethylene as a ripening agent. Recently Smock and Gross[5] stated that apples may evolve ripening gases other than ethylene. Conclusive data to support this suggestion have not come to the attention of the authors.

Except for the data of Fidler[3], Southwick[10], and the authors[3,4], the literature contains little information on the effect of air purification on the actual composition of fruit volatiles in the storage air. Some of these studies[4] have demonstrated the need of more frequent than seasonal reactivation of carbon to effectually remove fruit odors. The present studies and those by Fidler[4] show that even brominated carbon must be replenished every 30 to 40 days to insure satisfactory removal of ethylene. Recommendations for commercial installation suggest a minimum

TABE 3.—SCALD AND BREAKDOWN OF APPLES AND PEARS AS RELATED TO AIR PURIFIED STORAGE, 1952

| Variety | Kind of Air Purification | Kind of Wrap | Fruit removed from cabinet Mar. 17 and held at 65 F.[1] Slightly Scalded | Severely Scalded | Scalded (Total) | With Breakdown |
|---|---|---|---|---|---|---|
| | | | Per Cent | Per Cent | Per Cent | Per Cent |
| Red | None | None | 4.7 | 56.6 | 61.3 | 19.8 |
| | | Oiled Paper | 12.5 | 15.0 | 27.5 | |
| Delicious | Activated Carbon | None | 2.5 | 55.5 | 58.0 | 20.0 |
| | | Oiled Paper | 2.4 | 16.0 | 18.4 | |
| Apple | Brominated Carbon | None | 7.1 | 55.6 | 62.7 | 18.8 |
| | | Oiled Paper | 3.4 | 18.4 | 21.8 | |
| Rome | None | None | 11.3 | 53.6 | 64.9 | 16.1 |
| | | Oiled Paper | 11.2 | 16.6 | 27.8 | |
| Beauty | Activated Carbon | None | 14.0 | 46.4 | 60.4 | 16.3 |
| | | Oiled Paper | 16.3 | 14.8 | 31.1 | |
| Apple | Brominated Carbon | None | 13.8 | 40.2 | 54.0 | 23.3 |
| | | Oiled Paper | 6.1 | 6.0 | 12.0 | |
| Anjou | None | None | 0.0 | 96.2 | 96.2 | 47.5 |
| | | Oiled Paper | 55.5 | 36.0 | 91.5 | |
| Pear | Activated Carbon | None | 2.5 | 97.0 | 99.5 | 50.0 |
| | | Oiled Paper | 40.0 | 56.7 | 97.0 | |
| | Brominated Carbon | None | 17.9 | 76.7 | 94.6 | 69.6 |
| | | Oiled Paper | 39.4 | 26.1 | 65.5 | |

[1]Scald data were taken after ripening at 65F for eight days. Scald was termed "slight" when approximately 10 percent or less of the surface of the fruit was affected.
Rome Beauty apples and Anjou pears were examined for breakdown after 16 days and Red Delicious apples after 21 days at 65F.

of six pounds of carbon per 1,000 bu. of fruit and annual reactivation. Sixteen times the recommended minimum of activated coconut-shell carbon were used in these studies.

Some evidence has been presented to show that air purification may influence certain physiological processes in stored apples. Smock and Gross[8] found respiratory activity at 74 F and 38 F somewhat depressed. Poapst and Phillips[6] reported that soluble pectin values in Lawfam apples were lower in purified air than in normal storage. Firmness of the fruit stored in purified air as measured by pressure test has been found by certain investigators[7,8,9,12] to be approximately one pound higher than that of comparable samples in normal air.

In none of these studies, however, were data presented relative to the level of fruit volatiles in the storage air; only a few mentioned the condition and flavor of the fruit samples. It is reasonable to question whether differences in physiological response noted could be detected organoleptically to a commercially significant degree. The data presented in this paper, those from England[2], Australia[11], and unpublished data by Elmer Hansen of Oregon, M. H. Haller at Beltsville, Md., and D. V. Fisher in British Columbia generally failed to show a change in condition and physiology of apples as a result of air purification with activated carbon.

## Summary and Conclusions

The value of air purification of fruit storages at 31 F was studied under optimum conditions. The dessert and storage quality of apples and pears in three storages with three different carefully controlled levels of fruit volatiles was observed. Concentrations of ethylene and other volatiles in the control cabinet without carbon were approximately six times those in the storage purified with brominated carbon. Fruit odors in the former cabinet (with 0.5 mg of ethylene and 15 mg of non-ethylenic volatiles per cubic foot of air) represent rather high concentrations strongly detected by sense of smell. No fruit odors were apparent in either the brominated or the activated carbon storage.

The amount of carbon used in these studies was approximately 16 times that recommended for commercial use. Even the brominated carbon was found to possess a low adsorption capacity for ethylene; canister replacement every 30 days was necessary to maintain trace levels of this gas. Non-ethylenic fruit volatiles, however, were successfully held at a low level with filters of both types of carbon.

Data developed in this study shows that it was impossible to detect any benefit in condition or dessert quality of samples of apples and pears taken in January as a result of either differential or almost complete removal of fruit odors from the storage atmospheres. Examination of the test fruit in March indicated that brominated carbon may have been responsible for more rapid ripening of Anjou pears and Golden Delicious apples. At this time also it was not possible to recognize superior storage condition (as reflected by firmness, soluble pectins, or respiration measurements) of the fruit whose atmosphere had been purified by passage through activated coconut shell carbon.

Twenty-one members (including the authors) of a panel of 25 qualified fruit men failed to distinguish flavor differences due to air purification. Four members recognized a more mild, delicate varietal flavor, which they preferred, in the carbon lots directly from cold storage. These men were less specific in their preference for these lots after the fruit was ripened for one week. No abnormal flavors, suggestive of staleness or overripeness, were detected by the panel in any lots of fruit. No benefit to the appearance and the condition of the test fruit could be ascribed to air purification by the panel of judges.

Data obtained in this study shows that air purification by means of either activated or brominated carbon failed to reduce significantly storage scald of apples and pears. Where susceptibility to this storage disorder was pronounced, oil fruit wraps provided far more protection than did air purification.

The data presented in this study cast serious doubt on the value of air purification for fruit storages.

## Literature Cited

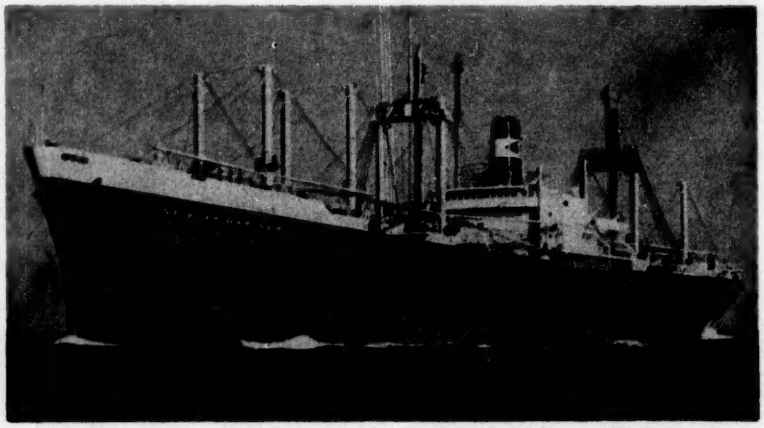
1. Colbert, J. W. Removal of ethylene from storage atmospheres. Refrig. Eng. 60: 265-267, 306, 1952.
2. Fidler, John C. Studies of the physiologically active volatile organic

*(Continued on page 54)*

# NEW MARITIME CARGO VESSELS

***Five new mariner class cargo vessels now in service by U. S. Maritime Administration with identical capacity and installations. Four refrigerated compartments.***

DELIVERY of eight Mariner Class dry cargo vessels was accepted by the U. S. Maritime Administration through February 1953. There were rumors indicating an innovation in sea-going refrigeration plants in that a sea-going cold storage warehouse would be incorporated in this latest class vessel. Inspection of a vessel at Ingalls Shipbuilding Corp. at Pascagoula, Miss., revealed that the vessel does have a cargo refrigerating plant and a certain amount of cold storage space, but the plant would be considered rather small in comparison with shoreside cold storage plants and the refrigerated hold of this vessel would be considered of modest proportion.



*The S.S. Lone Star Mariner, U. S. Maritime Administration C-4 class vessel, pictured on her trials in the Gulf of Mexico, December 1952. This 21,000 displacement ton, 20 knot speed vessel has cargo refrigerated spaces of 36,000 gross cubic feet ranging from zero degrees F to 55 F.*

## All Same Capacity

The fact that all vessels of this class are equipped with the identical capacity and arrangement of installation isn't quite new, but previously (aside from ship stores systems) most all refrigerated vessels were built for a specific trade or to the requirements of certain steamship lines, usually industrial carriers. The refrigeration plants in these new vessels are designed for 30,000 cubic ft., slightly in excess of 700 tons of refrigerated cargo, with a refrigeration plant of over 35 tons capacity.

Completely "post war" in conception and design, the Mariners are the result of studies undertaken after World War II to develop the best type of cargo ship possible for America's ocean trade and national defense, according to the Maritime Administration, U. S. Dept. of Commerce. With the launching of the United Nations campaign in Korea, the need for a new type ship for military support became inescapably clear.

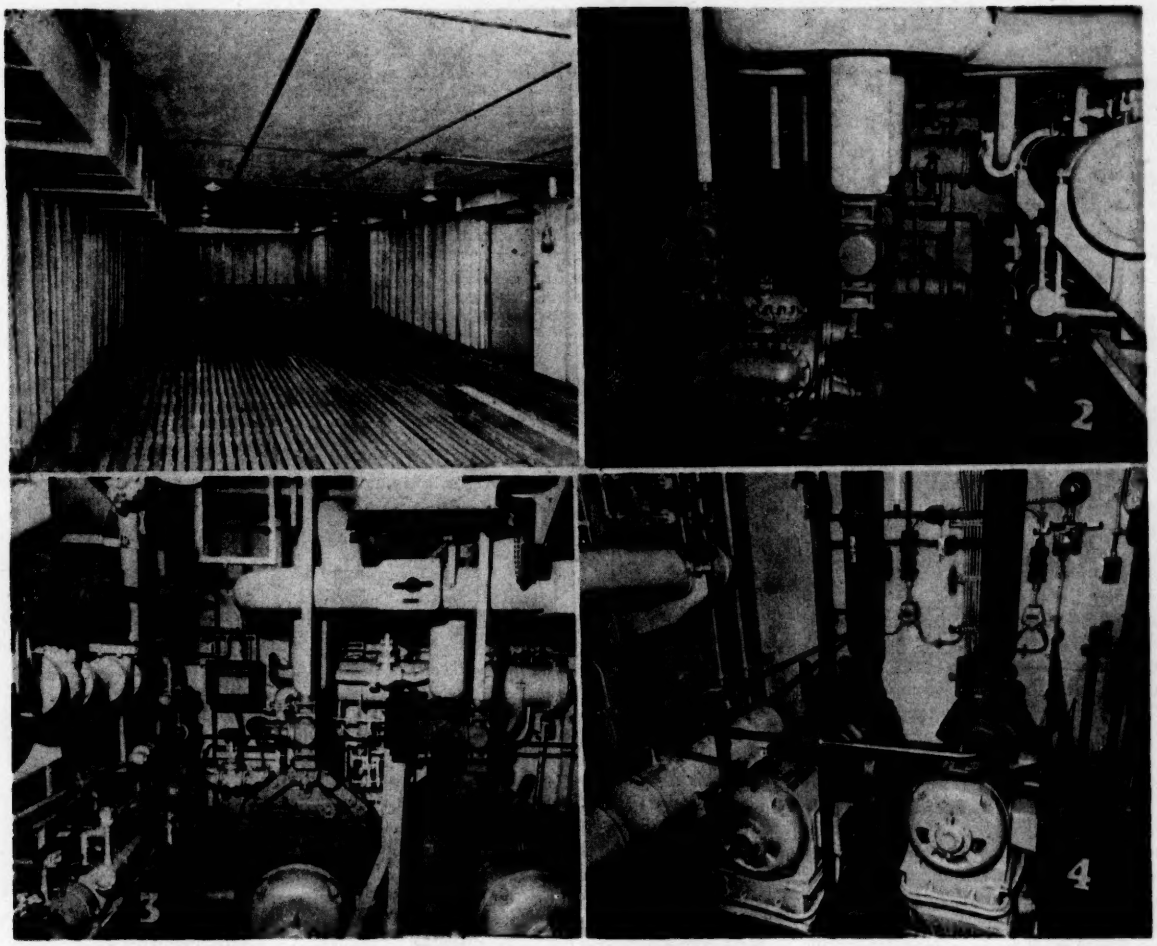
Military authorities turned to the privately owned fleet for the use of all tonnage not currently employed. This was quickly absorbed. Left in the reserve fleet anchorages were only the old 10-knot Liberty ships, the "workhorses" of the last war, plus a number of miscellaneous military auxiliaries and overage ships. "Reefers," refrigerated cargo vessels, had been constructed on both coasts, but for the most part were taken by private operators after Japan's fall. Vessels with any appreciable refrigeration tonnage withdrawn after the Korean outbreak, could be counted on fingers of two hands.

**Economic experts tell us that in the United States our higher standard of living is based on that final ten per cent gross income from our manufactures, agricultural products, and commercial enterprises. Further, they tell us that ten per cent of our National income is derived from Foreign Trade. Therefore, from an economic standpoint, as well as a national defense aspect, it appears that Foreign Trade is important to us all, and Refrigeration evidently is playing a larger part in this field than it has ever played before.**

In August 1950 a group of engineers and scientists engaged in a study of new techniques and developments of sea warfare, and had settled upon the conception of a fast and large dry cargo vessel which could be used with the maximum guarantee of safety in transporting vital cargos into war zones. Consultation with the most prominent ocean carriers and defense authorities pointed out the need for each vessel to have refrigerated capacity in a range of 0 to 55 F.

In September 1950, preliminary designs were completed by the Maritime Administration and at the end of the month the Nation's major shipyards submitted bids as design agents. In February 1952, the Maritime Administration accepted bids from five of these yards. The average awarded contract price was under eight and a half million dollars. The 35 new Mariners carried the nicknames of states; for example, Lone Star Mariner for the State of Texas, Magnolia Mariner for Mississippi, Pelican Mariner for Louisiana, and so on.

The Mariner ships are single-screw steel cargo ships, shelter-deck type, having a raked stem and cruiser stern. Propulsion is by means of a geared turbine, turning a 22-foot diameter propeller, to give the ship a speed of 20 knots at 17,500 normal shaft horsepower. The Mariner ship has seven cargo holds, four forward and three aft of the machinery spaces, and provisions are made for carrying refrigerated as well as dry and liquid cargoes. The length overall is 560 feet, beam 76 feet, draft load 30 ft., 13,000



*1—Interior view of one of four refrigerated cargo compartments of the U.S.S. Lone Star Mariner. This compartment is on the lower port side of the vessel, looking forward. Note large air ducts at the ship's side (left). Slots at the extreme left on the underside and near the top on the inboard side distribute air over and around perishable commodities. Overhead and bulkhead finishes are laminated cement-asbestos and aluminum, known as "Reeferite."*

*2—Cargo refrigerator compressors, consisting of three York VW, six cylinder, 1750 rpm machines, supplying 33 tons of refrigeration effect per day at minus 20 F suction temperature, with 88 F sea water condensing inlet temperature. Condenser No. 3 is pictured in the right foreground, receiver No. 3 below it, and dehydrator No. 3 at the level of the hand rail. Hand start and stop emergency controls are mounted on a pedestal at the extreme mid-left of the picture above the 50 hp AC motors.*

*3—Looking aft on the cargo refrigeration machinery flat: Two 50 hp Electro-Dynamic motors which drive No. 1 and 2 York VW compressors. Indicating and recording device mounted on aft bulkhead, left center of photo, has 30 remote thermometer stations. Heat exchanger vessels and piping at the left are condensers, receivers and dehydrators for cargo refrigeration systems No. 1 and 2.*

*4—Ship's service refrigeration machinery for the S S. Lone Star Mariner. Two York six cylinder VW compressors are pictured, each having 4½ tons refrigeration effect per day, at 1750 rpm, with minus 20 F suction gas and 88 F condensing water. One condenser and two receivers are pictured at the left. Note the hot gas defrost lines tagged in the upper center.*

dead-weight tons and a displacement tonnage of 21,000.

## Refrigerated Compartments

Refrigerated cargo compartments are located in No. 5 holds immediately aft of the engine room. There are four compartments in all, two on each deck. No. 1 and 2 compartments, each with a gross of 9500 cu. ft. are located port and starboard along shipsides at the 26 ft. level. Compartments No. 3 and 4, of approximately 1,000 less cubic content, are located similarly and immediately below at the 17 ft. level.

Each compartment is accessible from the landing area on its own level directly under No. 5 hatch and through two Jamison Marine-type cold storage doors in each compartment. Doors are 3 ft. 6 in. x 6 ft. with 10 inches of insulation, entirely metal clad with heavy galvanized sheet metal. All doors are equipped with safety devices prescribed by law to prevent anyone from being accidentally locked in the compartment.

Floors for these cold storage compartments consisted of ⅛ inch galvanized pan with 1½ inch mastic covering, reinforced with No. 18 USSG expanded metal. The pan rests on 1½ x 1½ x ⅛ angles 24 inches o.c., on laminated phenolic blocks 6 x 1 inches by full thickness of insulation, blocks being bolted

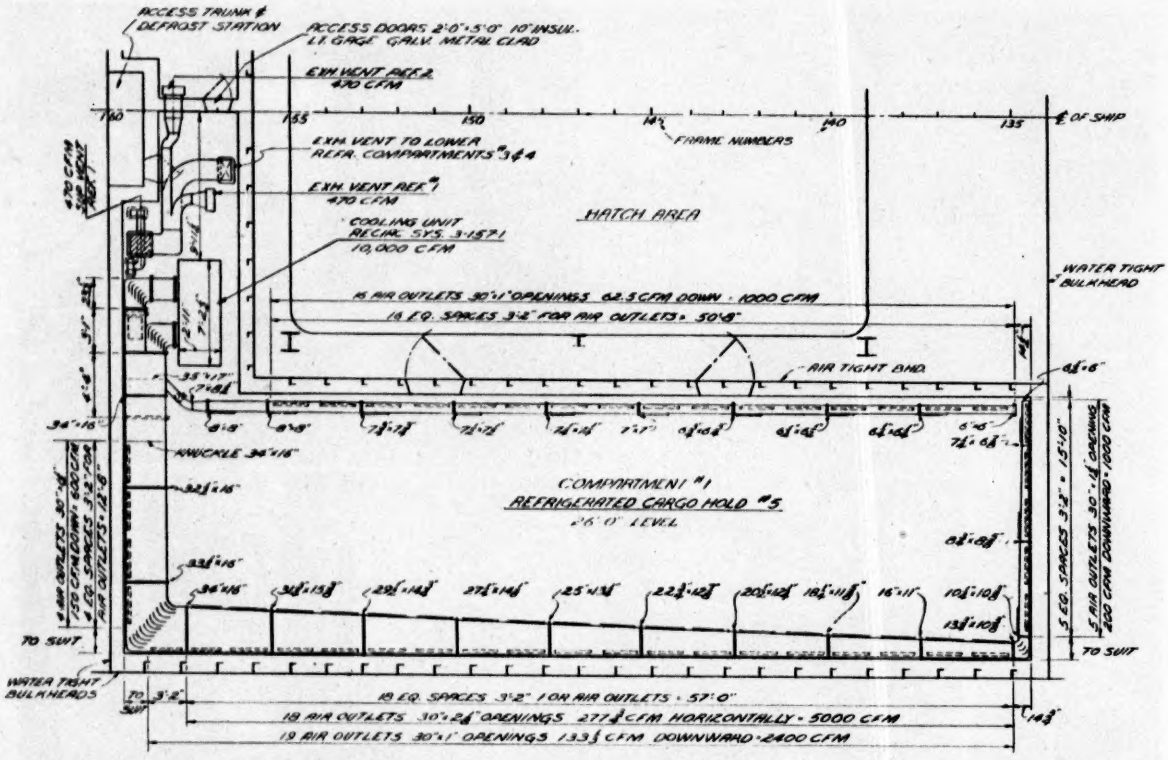

ACCESS TRUNK & DEFROST STATION
ACCESS DOORS 2'0"x5'0" 10" INSUL. LT. GAGE GALV. METAL CLAD
EXH. VENT REF. 2 470 CFM
EXH. VENT TO LOWER REFR. COMPARTMENTS #3 & 4
EXH. VENT REF. #1 470 CFM
COOLING UNIT RECIRC. SYS. 3-1571 10,000 CFM
HATCH AREA
FRAME NUMBERS
℄ OF SHIP
WATER TIGHT BULKHEAD
15 AIR OUTLETS 30"x1" OPENINGS 62.5 CFM DOWN - 1000 CFM
18 EQ. SPACES 3'2" FOR AIR OUTLETS - 50'0"
AIR TIGHT BHD.
KNUCKLE 34'-1⅛"
COMPARTMENT #1
REFRIGERATED CARGO HOLD #5
26'-0" LEVEL
TO SUIT
WATER TIGHT BULKHEADS
18 EQ. SPACES 3'2" FOR AIR OUTLETS - 57'0"
18 AIR OUTLETS 30"x2⅛" OPENINGS 277½ CFM HORIZONTALLY - 5000 CFM
18 AIR OUTLETS 30"x1" OPENINGS 133⅓ CFM DOWNWARD - 2400 CFM

***Fig. 5—Plan of compartment No. 1, Refrigerated Hold No. 5, S.S. Lone Star Mariner, built by Ingalls Shipbuilding Corp., Pascagoula, Miss., showing refrigerated air distribution through the cargo storage. Other three compartments are similar.***

to deck clips at the ship's deck and to the angles they support. Insulation of the floors is corkboard with 12 in. for the lower and 6 in. for the upper levels. Standard hardwood floor gratings support cargo and provide circulation beneath.

Walls, bulkheads and deckheads are Johns-Manville "Reeferite" attached similar to the steel pan on the floors; that is, with angle bars, phenolic blocks and clips. Douglas fir battens are installed 9 in. apart vertically on the walls and bulkheads to keep cargo off the surfaces and to provide space for air circulation. Insulation of upper level deckhead and all perimeter bulkheads or wall is 12 in. of Fiberglas. Deckhead at 26 ft. level is six inches of the same material.

## Load Conditions

All refrigerated cargo compartments were designed to accommodate the following load conditions: Condition No. 1, minimum 0F for meat, frozen foods and frozen vegetables, loaded frozen and at maximum temperature 25F; Condition No. 2, 35F for fresh fruits or vegetables loaded at 85F and requiring a supply of fresh air at one change per hour; Condition No. 3, 50F for commodities loaded at 85F with a supply of fresh air at the rate of three changes per hour required.

Specifications required the builder to construct and insulate the refrigerated cargo holds in such a manner that they would comply not only with the material specifications, but further maintain all or any one of the refrigerated compartments at the designed temperature, mentioned above, with an outside ambient of 100F with no sweating. Further, the compartments were tested together and independently to the specification that they should not exceed 2 degrees per hour rise for 0F and below, and a rise of 1½ degrees per hour for above 0F, for a period of 6 hours, with 85F ambient temperature and with no machinery running.

## Refrigeration Machinery

Cargo refrigeration machinery consists of three York VW compressors, each with 6 cylinders of 3¾ by 3 inch bore. These machines are single acting marine type with refrigeration suction gases entering the cylinders direct and not through the crank case. The machines have a maximum operating speed of 1750 rpm and are capable of a minimum of 11 tons each of refrigeration with a suction temperature of minus 15F. Lubrication is forced feed. Refrigerant is Freon-12. Vessel carries nine spare 145 lb. Freon flasks.

Motor drives are Electro-Dynamic, 440 v, three phase, 50 hp each, driving the compressors through a flexible coupling. Each compressor is arranged to handle the load of any two compartments, and any two machines may handle together or in split systems all compartments either arranged port and starboard, or by upper and lower level combinations. At 50F, all four compartments may be handled by one compressor. The entire system is designed to operate under extreme conditions of rolling, pitching or permanent list, as is required of all marine installations.

Condenser equipment for this system consists of three horizontal shell and tube exchangers with ⅝ in. o.d. by No. 18 ga., 70-30 cupro-nickel tubes, each having 300 square feet of effective cooling surface. Circulating water is furnished by cargo refrigeration condenser water pumps. Condensers were designed to perform with sea water temperature as high as 88F, circulating 5 gpm per ton with a condensing temperature of 105F. The amount of circulating water is controlled automatically through regulating valves of the pneumatic control type installed at each condenser outlet.

Receivers are located directly under each of the condensers. They are marine type and connections from con-

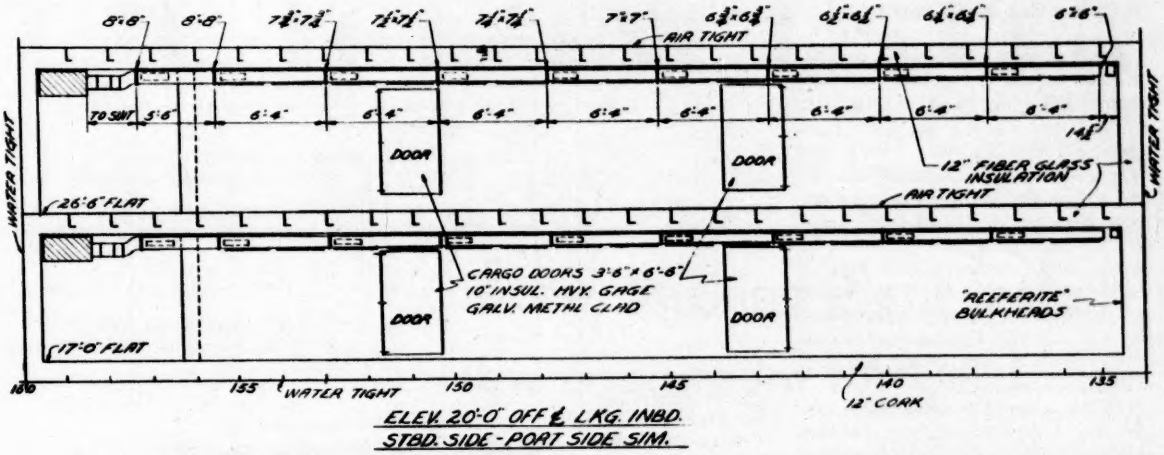



*Fig. 6—Elevation showing refrigerated Cargo compartments Nos. 1 and 3. View is 20 ft. to starboard off vessel center line looking inboard.*

denser to receiver are in duplicate and near the heads of each heat exchanger. Dryers are installed in the liquid line from each receiver, and strainers are located in the liquid line to each compartment. Heat interchangers are installed in the suction line from each compartment. Relief valves in the system are all set for 200 psig and discharge into the suction lines. Machines are equipped with rupture discs.

Evaporator coils are "air coolers, vertical type," a maritime designation of a floor type diffuser unit. Units are direct expansion, finned coil, with 1800 square feet of air-side surface. They are equipped with drip pan and defrost spray nozzles, and are completely galvanized construction with exception of coils which are cupro-nickel. Air cooler fans are V-belt driven and capable of better than one change of air per minute in an empty compartment, each 10,000 cfm on the upper larger compartments and 9,000 cfm on the lower sections. Motors are two speed, 440 volt, 3 phase, 60 cycle, dripproof, with ⅓ speed reduction permissible. Upper compartments are each equipped with 470 cfm fresh air supply and exhaust vent sets; compartments below are identically equipped with 430 cfm units.

Heating coils are provided in the air coolers and built integral. They are capable of holding compartments to 55F with an outside ambient of 0F. Coils are copper with tin plating and controlled by pneumatically operated steam regulating valves. The diffuser compartment in which the evaporator coils are housed is located in the after end of each level, between the two refrigerated compartments.

Supply air ducts run outboard across the aft end of each compartment from the diffuser room, and then forward along the shipsides. They are arranged to distribute 50 per cent of the refrigerated air over the cargo just below the deckhead, and 50 percent vertically downward along the shell insulation and between the vertical battens to the undergrating and between the grating sleepers. The air is returned to the diffuser room through the cargo to a perforated bulkhead between the diffuser room and the refrigerated compartments.

Defrosting is manually accomplished with hot sea water from the machinery spaces, pumped through lines in the shaft alley and up the access trunk between the diffuser rooms. A defrost control station is in the trunk on each level. Drains from each branch defrost line run to a deck drain at each station in the trunk. Within the refrigerator compartments the branch lines drain to the cooling units and through double drains in the unit pans to the ship's drainage system. Moisture is blown out of the branch lines and the air cooling coils by compressed air which reaches the defrost stations through ¼ inch lines from the machinery spaces.

The sea water heater is capable of raising temperatures from 50F to 100F at 50 gallons per minute. Heat is accomplished by steam introduced into a steel shell and sea water passed through cupro-nickel tubing. Access to the diffuser rooms is by vertical trunk from the shelter deck above.

## Controls and Safety

The cargo refrigeration system is equipped with many controls and safety devices. There are three dual-pressure-stats, one for each compressor and equipped with external knob for adjusting the high and low pressure setting; eight thermostatic expansion valves, two per air cooler; one liquid solenoid valve for each diffuser unit and four water tight thermostats for operating the solenoids, and are complete with room type remote bulbs and 18 ft. of capillary tube. Four suction pressure regulating valves equipped with automatic controls and with valved by-passes for manual operation are in the system.

Some thirteen gauges are included, with one discharge and suction pressure gauges on each compressor, a gauge for each suction pressure regulating valve and one gauge for the overboard valves. Four thermometers are in the condensing water system, one in the suction line and one each in the three overboard discharges; three thermometers in the compressor discharge lines; and eight thermometers in the air distribution system, one thermometer for the discharge air and one for return air to each of the four cooling units.

A Brown number 156x63, W30, 30 point unit potentionmeter type indicator and recorder is located in the engine room, which is capable of indicating temperatures from minus 20F to 120F in half-degree divisions. The device operates on 115 volt, single phase, 60 cycle source.

Freon suction lines throughout, liquid lines from heat interchangers to air cooling units, and hot salt water defrost lines from defrost station to cooling units, are all insulated and lagged.

In addition to the plant for refrigerated cargo, the remaining cargo holds of the ship are equipped with a dehumidification system which is automatic in operation and which maintains cargo holds at any degree of humidity required for the safe preservation of the cargo. The air to the cargo holds is distributed and system so arranged that the mixture of recirculated and fresh air is automatically adjusted to the proper humidity.

## Ship Service Refrigeration

Ship's service refrigerators number six; and include a vegetable and fruit room of 1370 gross cu. ft. at 35F; dairy refrigerator, 390 cu. ft., 35F; thaw room, 875 cu. ft., 40F; frozen food locker, 390 cu. ft., meat 1260 cu. ft., and a fish and ice storage compartment, 390 gross cu. ft., all at 0F. These six compartments are grouped together on the outboard, port side, of the second deck just aft of No. 4 hold, for provisioning through sideports or No. 4 or 5 holds, and for easy access to the butcher shop, galley and food preparation facilities.

The ship's service refrigeration system is also an automatically operated plant, using Freon 12 as a refrigerant. In addition to the stores compartment, an ice-maker and a "scuttle-butt" (ice water chiller and storage tank) are attached to this system. The ice-maker is capable of producing 100 lbs. of cubed ice in three pound ice trays every 24 hrs. The "scuttle-butt" is rated at 10 gallons per hour when reducing water temperatures from 100F to 45F. It has a storage capacity of 60 gallons which it maintains at 45F. The system is designed, and the rooms insulated to maintain the designed temperatures when the deck below rooms is 120F and all other surfaces 100F.

Machinery for ship's service system consists of two six cylinder, single acting, marine-type York compressors. Like the cargo compressors, the suction gases enter the cylinder direct without entering the crank case. Lubrication is forced feed. Each compressor is capable of four and one-half tons of refrigeration effect when the suction temperature is minus 20F. One compressor is capable of handling the entire load. The second unit is for standby, a practice required by Maritime regulations.

Compressors are driven by 25 hp Electro-Dynamic motors with flexible couplings. The machinery is capable of operating at a maximum of 1750 rpm. The system is equipped with two shell and tube condensers, and two receivers. Although not as large as the cargo system condensers, these ship service system exchangers are tubed with the same size and type of tubes and are rated similarly. Strainers are located in liquid lines to each refrigerated space, and dryers are located in liquid lines from each receiver. Relief valves, rupture discs, suction pressure regulating valves, thermometers and gauges are located almost identically in this system as in the larger one.

However, the systems differ with respect to heat exchangers. In this system there are only two heat exchangers, one located in each suction line near the compressors. Evaporative coils in vegetable and fruit, dairy and thaw rooms are ceiling hung "air coolers" (diffuser units), and in the frozen food, meat and fish and ice compartments are one-inch or 1¼ inch standard steel galvanized wall and ceiling coils. "Air coolers" are standard type finned coils with ½ in. o.d. copper tinned tubes and equipped with motor, fan, and drip pan. All steel parts are galvanized.

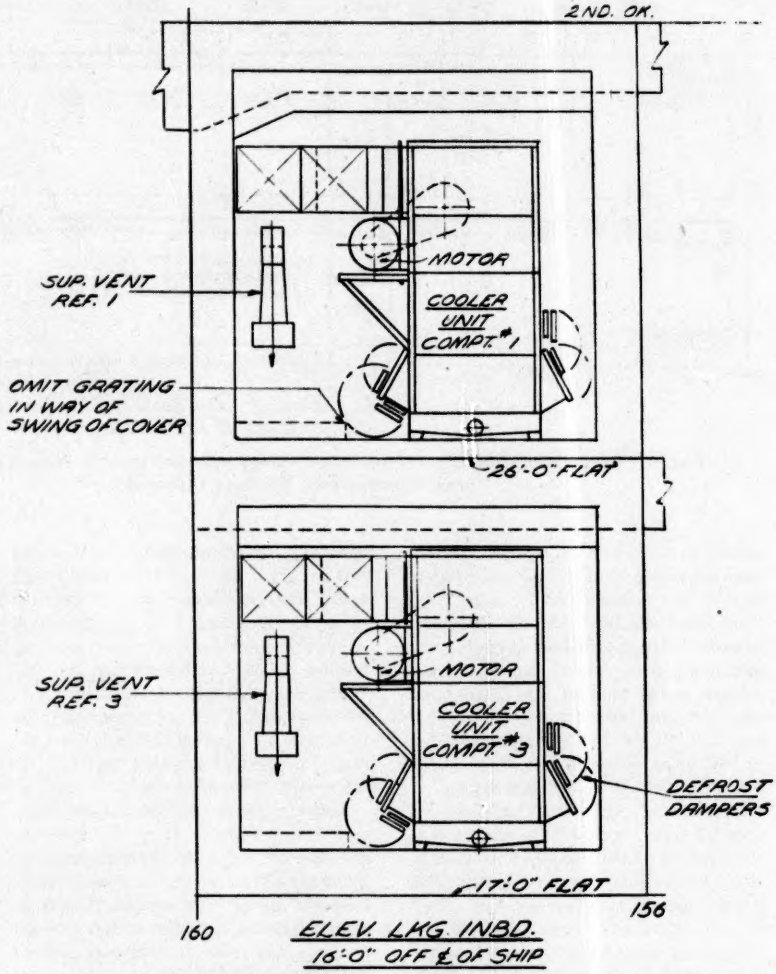



*Fig. 7—Section through diffuser rooms for compartments 1 and 3. View is inboard from a position 16 ft. starboard of centerline of vessel.*

Inspection by the technical editor of ICE AND REFRIGERATION of this class vessel was made on the SS "Lone Star Mariner" built by Ingalls Shipbuilding Corp. at Pascagoula, Miss., at the time the vessel was delivered to the U. S. Maritime Administration, December 22, 1952. Lykes Brothers Steamship Company of New Orleans, Louisiana, is the operator of the vessel on a General Agency Agreement with the U. S. Maritime Administration. They operate the vessel for the Military Sea Transportation Service, and will probably operate the vessel to the Far East or the Mediterranean depending on the military needs of Uncle Sam.

Lykes Lines normally operates C-1 vessels in Caribbean and East Indies trades out of New Orleans, Houston, Port Lavaca, and Galveston. Chilled and frozen meats, fresh vegetables, eggs and dairy products are generally the refrigerated cargoes carried. These cargoes are normally delivered to the vessel in U. S. Ports from refrigerated warehouses, such as: Galveston Ice and Cold Storage Co., Liberty Ice and Cold Storage Co., Galveston; Houston Terminal Warehouse and Cold Storage Co., Texas Creamery Cold Storage Co., Houston; U. S. Cold Storage Corp., Port Lavaca; and, Liberty Ice and Cold Storage Co., New Orleans Cold Storage and Warehouse Co., Pelican Ice and Cold Storage Inc., Tropical Ice and Cold Storage Co., New Orleans.

Occasionally, when timing has been fortunate, refrigerated products are delivered dock-side in cars leased by Pacific Fruit Express Co. or other refrigerated rail carriers.

# THE ICE INDUSTRY

NATIONAL ASSOCIATION OF ICE INDUSTRIES

*Executive Offices*
1706 L St. N.W., WASHINGTON 6, D.C.

*Executive Secretary*
GUY W. JACOBS, WASHINGTON, D.C.

*President*
WM. J. AYERS, MEMPHIS, TENN.

*First Vice-president*
PAUL H. ANDRES, OKLAHOMA CITY, OKLA.

*Second Vice-president*
E. L. GUNN JR., ATLANTA, GA.

*Treasurer*
GEO. STEERS, JR., KALAMAZOO, MICH.

## THIS MONTH IN BRIEF

A packing plant at Pueblo, Colo., operated by The American Stores Company, an eastern food chain, has installed new icing making equipment for making briquettes.

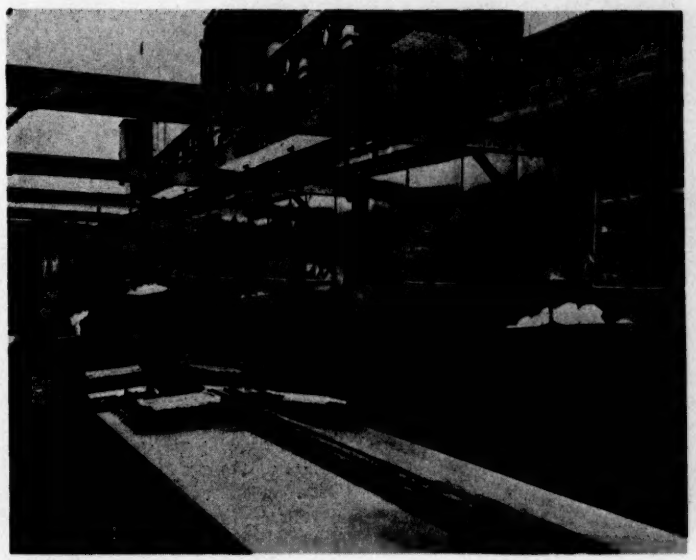
Annual convention of the Michigan Ice Industries Association covered important industry problems through panel discussions.

Ice plant operators and engineers from Florida, Alabama, and Georgia attended a two-day short course for engineers at Panama City, Fla., sponsored by the Florida Ice Association.

Regional spring meetings of the Delta States Ice Association were held during March at Thibodaux, Natchidoches, and Monroe, La. Program took the form of round table discussions of general merchandising, vendors, icing farm products, advertising, and other subjects of interest to ice men.

The annual convention of the North Carolina Ice Association, held at Winston Salem, N. C., heard panel discussions and addresses on various phases of the ice business.

# Grocery Packing Plant Installs New Equipment for Car Icing



*View over refrigerator cars, showing 4-in, I-beam track and trolley conveyor line with drop-finger pushers. These hinged pushers engage push bar of two-wheel trolleys from which buckets of ice are suspended on flat-bar track.*

THE American Stores Company, operating approximately 1,500 grocery and retail meat stores throughout the East, also operates a packing division at Pueblo, Colo. In connection with shipping the meat products across country, up to 35 tons of ice is needed daily to fill the end bunkers of refrigerator cars.

The plant formerly operated a can-ice manufacturing plant for making 300-lb. cakes, which then had to be crushed or broken down for use.

Today, the ice is made much more conveniently and economically in directly usable size in two freezers, which successively transform water into slush ice and 1½ lb. briquettes at the rate of 21 per minute per machine.

These briquettes are delivered directly to foot of a Link-Belt vertical steel-encased centrifugal discharge bucket elevator, employing 8 x 5 in. Style "A" buckets on a single strand of Class "C" Combination chain, which raises the ice a distance of about 38 ft. to feed into a surge hopper.

The elevator buckets, chain and elevator casing are galvanized to prevent corrosion. The elevator casing has also been painted.

The surge hopper has a manually controlled gate through which the ice is discharged directly into self-dumping, self righting tub buckets which are suspended from two anti-friction grooved trolley-wheels riding on a flat-bar "beef rail" track.

A loop in beef-rail allows for accumulation of empty and filled buckets at loading point inside of

*At 5-h.p. variable speed drive and turn of conveyor into building, where buckets are filled with ice. Shows man supervising discharge of ice into car bunker.*

building. Each bucket holds about 300 lbs.

Whereas formerly there was only a beef rail along which an attendant walking on top of cars pushed the buckets of ice, today's handling system automatically moves the buckets along beef rail, over the entire loop of track above the two parallel car loading tracks.

This is accomplished by a Link-Belt electrically-operated pusher trolley conveyor, 660-ft. long, paralleling the beef-rail track.

### Conveyor Line

Conveyor line consists of a strand of drop-forged Rivetless chain suspended on edge at 32-in. intervals from ball-bearing trolleys riding on an endless 4-in. I-beam track.

Conveyor can be operated at a variable chain speed of 15 to 45 feet per minute, and is fitted with hinged drop-finger pushers at 24-ft. intervals for engaging pushing bar of beef-rail trolleys and moving the buckets of ice along track.

The attendant on top of refrigerator cars, who looks after the bunker icing and salting operation, lifts the drop-finger pusher with a stick to hold bucket at bunker and then releases bucket latch to allow the bucket to discharge.

The empty bucket automatically returns to its upright, latched position and is pushed ahead into pusher conveyor by attendant.

It continues on the beef-rail circuit, back to vicinity of loading hopper gate, where the bucket automatically rolls away from drop-finger pusher as the conveyor chain goes around a turn wheel.

When bucket is re-filled, the attendant at loading station pushes it ahead sufficiently for the next power pusher to engage and move it out of building, back over the refrigerator cars.

Individual cars may require anywhere from 3,000 to 10,000 lbs. of ice, depending upon whether car is being initially iced or is simply being recapped.

### Icing Time Reduced

The total icing operations are now performed in about four hours each day, which compares with eight hours required previously.

F. W. Blaney is plant superintendent at the Pueblo plant. W. B. Felton is chief engineer.

## Ice Company 30 Years Old

THE thirtieth anniversary of The Crystal Ice Company, Savannah, Ga., was observed recently by W. Frank Garvin, founder. The company has been at the same location, Jones and Jafferson Streets, since it was established.

## Vending Station Shows Good Return on Investment

THE chart illustrated below shows operating details of an ice vending station. The figures are the result of one operators' experience. It shows that power, maintenance, property rental, interest on investment, depreciation, taxes and insurance (fixed yearly expenses) total $1,135. The lower line represents ice costing $9.00 per ton in the station ready to vend. The top line is the gross profit, based on iced sold at $20 per ton.

Based upon a vending machine costing $3,500 and selling 100 tons a year, net profit would be $2,165 or a 60.4 percent return on the invested capital.

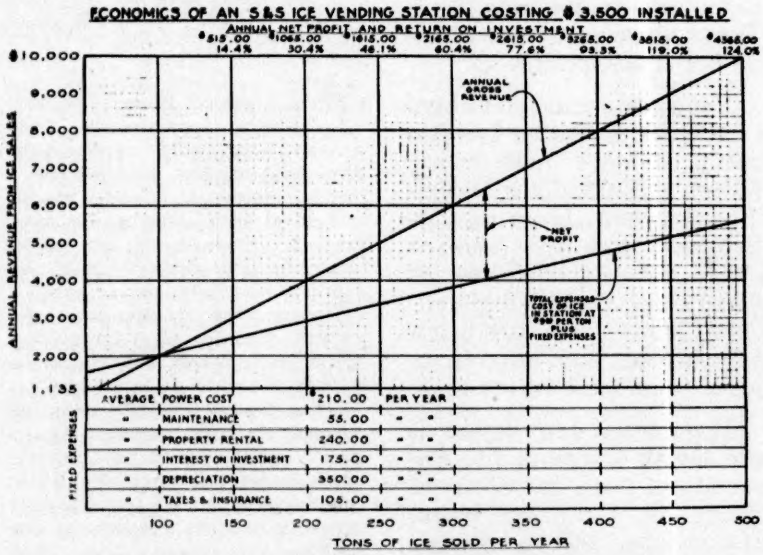



*Chart showing economies of an ice vending station costing $3,500 installed. Courtesy S & S Vending Machine Co.*

# Reports from Unit Ice Associations

## Michigan Ice Industries Annual Meeting

THE thirty-sixth annual convention of the Michigan Ice Industries Association was held at the Detroit-Leland Hotel, Detroit, February 17 and 18. The general plan of the convention was of the open forum type, and the round table discussions of the various subjects, were most interesting and instructive.

### Panel Discussions

Written questions were submitted by the membership prior to the convention and these questions were distributed by the moderators to their various panel members, according to the subject assigned to the individual panelist. Definite answers were prepared in advance, and after the panel member gave his answer the question was thrown open for discussion from the floor. The response was very gratifying indeed, and indicates that this type of convention is in much more demand and can be of much more value to the membership than a program of all speakers.

The first open forum and round table discussion was directed by George E. Steers, Kalamazoo, covering the following subjects:

Advertising and Sales Promotion, led by E. K. Wellman, Detroit.

Ice-Using Equipment, led by E. L. Trusty, LaPorte.

Meat, Poultry & Vegetable Icing, led by D. J. Martin, Detroit.

Comparative Trend of Types of Ice Sales, and the Units of Sale, led by Edw. A. Waier, Saginaw.

The second forum, directed by E. T. Scott, Grand Rapids, covered the following:

Vending, led by Leonard Borin, Detroit.

Operating Economies, led by Wesley Brown, Benton Harbor.

Manpower, led by O. A. Weber, Flint.

Diversification, led by Albert Blackmer, Muskegon.

While the attendance was down somewhat, due principally to the "Flu" epidemic, this was one of the most successful conventions held. The Directors voted to conduct a Spring Conference in May and a Fall Conference in October.

Guy W. Jacobs of the National Association gave a very clear and concise picture of what the National is doing for the industry and its individual members. This was a very interesting presentation and everyone left with a better idea of what the Associations, both State and National, are accomplishing for them.

The entertainment feature of the convention was second to none. The Elmwood Casino in Windsor, Canada serves the best food, and the floor show was one and one-half hours of top flight entertainment. The morning breakfast on Wednesday was very enjoyable and a good get-together feature.

The following new officers and directors were elected:

### Officers

President, Leonard Borin, Detroit.

First vice-president, Wesley H. Brown, Benton Harbor.

Second vice-president, Vernon Powell, Cadillac.

Secretary - treasurer, Edward W. Jackson, Kalamazoo.

Directors: Albert Blackmer, Muskegon; Wilbur Kooienga, Grand Rapids; Edward A. Waier, Saginaw; O. A. Weber, Flint; Eugene K. Wellman, Detroit.

## Canadian Association of Ice Industries

MRS. MILDRED E. CROFT, SECRETARY

A GROUP of southern Ontario ice dealers met March 5 at the Old Mill just outside Toronto to discuss ways and means of merchandising refrigerators and it was apparent that from the large attendance, the sale of domestic ice refrigerators is still possible for those companies who actively merchandise them.

Two plans were discussed. The first plan was the selling of an ice refrigerator with no down payment and a 10 cents per day basis. Payments would be collected monthly but it was felt that for advertising purposes 10 cents per day was certainly a powerful weapon to use.

The second plan was somewhat similar in so far as it gives complete refrigeration for 25 cents a day which includes ice. This could be collected at the rate of $1.75 per week. It is estimated that 150 lbs. of ice would be used in the refrigerator and the balance of the money would be deposited towards paying for the refrigerator.

A number of companies will be trying out both these plans for the next few weeks and a group will be meeting on April 16 to pool their findings at the annual spring conference which will be held on that date.

The harvesting of natural ice in many parts of Canada, especially in the resort areas, is very poor this year and many ice manufacturing companies are availing themselves of the assistance given them by the weather man and are planning to sell ice in resort areas this summer.

## New England Ice Association

R. T. WILBER, Secretary

THE next regular meeting of the New England Ice Association and the Board of Directors will be held at the Kenmore Hotel, Boston, Thursday, April 16. This meeting will follow the same pattern as the last two, which according to those present were very successful. A good turnout is expected as this meeting will be held just previous to the busy season.

The December meeting was adjourned before the program was finished and for this April meeting an early start is suggested. Some time will be alloted for discussion of engineering and maintenance. The National Association has been invited to have a representative present. We will also have a report from one of our members who attended the National Convention.

Subjects selected for discussion will include diversification, sales, corn and meat icing, one-man plants, lockers and quick freeze, sized ice, carvings and punch bowls, vendors, company versus driver owned routes, merchandising stores.

## Illinois Association of Ice Industries

THE annual convention of the Illinois Association of Ice Industries will be held at the Emerson Hotel, Mt. Vernon, Friday, April 24. The opening session will start promptly at 10:00 a.m.

Wm. D. Wright, secretary of the association, who has been recuperating at Gulfport, Miss., plans to return home Easter morning and will be at the convention as usual. He announces that the program, compressed into one day instead of two, will be interesting and instructive to all ice men. Many of the members plan to arrive the evening before to meet and visit with friends.

# Ice Plant Owners and Engineers Attend Florida Engineering School

ICE plant owners and engineers from Alabama, Georgia and Florida were in attendance at a two day short course for plant operators in Panama City, Florida, February 17 and 18. The Florida Ice Association, sponsor of the school was materially aided by the Gulf Coast Ice Association in securing a large enrollment in spite of the flu epidemic in the state.

The president of the Florida Ice Association, in opening the meeting, stated this was just one of the services of the state association and assured enrolees that they were anxious and ready at all times to help them in any way possible.

## Plant Housekeeping

John Massey of the Florida State Board of Health, gave an interesting talk on "Plant Housekeeping." He stressed the need not only for good housekeeping methods in the plant but on all equipment as a whole—including ice-crushing and sizing equipment, storage bins, delivery bags, etc. Only through following the practices that insure purity in the water used for ice-making can the ice maker insure that water will not become contaminated after entering the plant from the city water supply mains.

Some of the avenues of contamination he cited: dirty tank rooms, or tank tops and unprotected water storage fore-cooling tanks. He advocated the regular washing of can covers with hot water and daily dry-mopping of the tank top. However, caution should be taken that lids are completely dry before they are replaced on the cans.

## Automatic Controls

In a discussion of "Automatic Controls" J. W. Barnes, owner of the Barnes Ice Company, Quincy, Florida, gave evidence of the economies possible in both labor and power in the average plant of ten to thirty tons or larger, when it is equipped with automatic controls.

Mr. Barnes described in detail the types and applications of automatic controls installed in his three ice plants and showed how both labor and power costs had been materially reduced. He said that, in providing automatic equipment in his plants, full advantage was taken of all automatic safety devices to insure protection against excess condensing pressures, power, failures, etc., that can occur when plants are operated without an attendant at nights and over holidays.

## Brine—Handling and Problems

J. W. Nipper, President of the Gulf Coast Ice Association, presided over the afternoon session at which C. F. Wittichen, Jr., of the Wittichen Chemical Company, Birmingham, Alabama, discussed "Brine—How to Handle—Problems in Use" gave a factual and highly interesting talk on the damage to physical equipment possible by the action of corrosive brines on metals and described the steps that should be taken to minimize such losses.

Speaking of the eutectic point of brines, Mr. Wittichen said that for salt brines the figure is 2.256 pounds per gallon which gives a freezing point of minus 6 F and for pure calcium chloride it is 4.33 points per gallon with a freezing point of —59.8° F. In order to keep pH at optimum values, it is necessary to add corrective chemicals to restore ideal conditions.

In comparing the advantages and disadvantages of salt and calcium chloride brines, Mr. Wittichen said that the principal benefit of salt brine in ice-freezing tanks is the much lower first cost, but the disadvantage is more corrosive action with salt brine than with calcium brine. Then, too, for a given freezing point, the salt brine requires greater weight per gallon. Where refrigerated brines are pumped through cooling coils, calcium brine offers a saving in pumping cost when a strong brine is needed for low temperature refrigeration.

Mr. Wittichen cautioned that it is always wise to maintain good circulation in the tank and to hold the brine level as nearly constant as possible, as when the brine level drops below normal, corrosion occurs on the area of the exposed wetted surfaces.

## Behavior of Ammonia

Ray F. Lewis of the Henry Bower Ammonia Company, talked on the "Behavior of Ammonia." The audience learned many interesting facts about anhydrous ammonia and its application in the production of ice. Mr. Lewis recommended that wherever practical, ammonia evaporators should be operated flooded in order to insure maximum heat transfer per square foot of available pipe surface. Another advantage is lowered power cost per ton of output by reason of the resulting higher suction pressures and greater compressor capacity.

Russ Penly, Manager of the Atlanta Branch, National Rejectors, Inc., spoke on "Repair of Coin Devices on Vendors." His talk will doubtless be remembered as one of the best and most comprehensive discourses on the subject presented by any engineer in this field.

To demonstrate, Mr. Penly used several of his company's standard coin machines, showing their construction and operation. He explained how provision has been made in their design and construction to throw out "slugs" and how the design insures that the coins, quarters, nickels and dimes, travel to their respective stations in the box and finally, how the machine automatically delivers the correct piece of ice for the money inserted. He also demonstrated how the machine should be cleaned of dirt accumulations that would eventually interfere with its mechanical operation and explained the function of the magnetic field through which the coins pass, and just how the field affects the speed of the coin.

At the third session, presided over by J. W. Nipper, C. T. Baker, Consulting Engineer, Atlanta, presented the second discussion of "Rules and Formulas for the Plant Engineer.

## Lubrication

B. W. Murray, Lubricating Engineer, Sinclair Refining Company, discussed "Economy and Efficiency Through Proper Machinery Lubrication" in an instructive and carefully prepared lecture. He explained the meaning of the terms, sliding and rotating friction, the Saybolt Method of measuring oil viscosity and clearly explained much of the terminology that is common to lubricants.

Mr. Murray also explained the theory and fact of bearing lubrication and described how the lubricant supported compressor shafts from direct contact with the bearings. He showed that in all types of oil or grease lubricated bearing that is properly and safely lubricated, an old film prevents metal to metal contact.

## Compressor Operation

Frank Hall, owner Hall Machine Shop, New Smyrna Beach, Florida, spoke on "Compressor Operation and Maintenance." He discussed the proper method of fitting pistons and rings in compressors and also discussed fully how best to grind in and make tight suction and discharge valves and safety heads. He referred specifically to the necessity for the inclusion of good oil rings in all vertical compressors and the need for the drilling of the piston skirts to permit the free return of oil from the interior of the piston to the crankcase.

In stressing the need for the proper fitting of safety heads he stated that they should not be under cut. He said that one of the factors in connection with compressor operation that had given much trouble was the outboard bearing. Oftentimes, he said, this outer bearing was found to be out of adjustment and that when the shaft was low or out of true alignment, making it almost impossible to keep the packing joint from leaking badly and wasting ammonia. He gave very complete information on the proper fitting of piston rings to the grooves in the piston and emphasized this was important.

### Safety

At the Fourth Session C. J. Schrenker, New Amsterdam Casualty Co., Jacksonville, Florida, discussed safety measures. In his introductory remarks, the speaker clearly emphasized the need for safety programs in the plant and said that the only way in which employees could be led to take an interest in accident prevention was to make them safety conscious through safety programs and accident prevention training.

The best way to reduce accidents, he said, is to organize for accident prevention. He showed that unless every ice manufacturer works to hold this accident ratio down, his accident insurance rates will be increased and eventually his firm will be placed in a higher risk bracket because of his high accident ratio. This means that he would pay an additional premium and that should he continue to operate his property in such a manner as to cost the insurance company more money annually than they receive for his insurance, it will be only a matter of time until such operators might be unable to obtain accident insurance at any price.

Mr. Schrenker listed a number of case histories to show how a number of large organizations had developed safety programs which had resulted in reduction of their accident rates and in consequence of this has obtained more favorable insurance rates.

### Insulation

The concluding discussion was presented by D. J. Amorose, Manager, Armstrong Cork Co., Jacksonville, Florida office. In addition to a highly instructive discussion on insulation, a film was shown showing the proper selection and application of low temperature insulation.

Following the presentation of the film a Question and Answer period was held after which the meeting adjourned at 4:00 p.m.

## Louisiana Spring Regional Meetings

ON MARCH 9, 11 and 12 spring regional meetings were held respectively in Thibodaux, Natchitoches and Monroe, La. While the attendance was not as great as anticipated, 66 members in all were on hand to discuss ways and means of capitalizing on the opportunities to sell more ice for profit.

The practical aspects of round-table discussions were clearly evidenced and demonstrated during these three meetings. The questions and discussions revealed different problems existing in the various sections of the state. Everybody was optimistic over this season's ice business and—"we've only just begun to fight"—was the slogan generally adopted.

Some of the conclusions reached by the three groups were:

1—Tonnage has reached a very low mark, but appears to be leveling off.

2—Rural delivery by company operated routes has ceased to be profitable in most localities.

3—Peddler routes with two or three deliveries per week are solving the rural domestic delivery problems.

4—Urban domestic routes have lost tonnage and many are now served by peddlers. Many still holding to company operated delivery in towns, but servicing thrice weekly.

5—Commercial Deliveries (a) Slight loss in most markets. (b) Ice making machines have made little progress except in the large markets. (c) Where ice making machines are in use, there is still a demand for ice, due to frequent breakdowns and inability of machines to produce rated capacity. (d) Due to increase in price of ice to intermittent customers, there is very little loss in revenue. (e) Poor performance of some of the first ice making machines put on the market has caused some customers to resume the purchase of ice.

6—Quite a few small chicken processing plants over Louisiana account for considerable ice tonnage.

7—It has been almost universally accepted by merchants that displaying poultry on a bed of ice increases their sales.

8—Diversified farm programs in many sections of Louisiana have resulted in considerable ice tonnage since the first of the year. (a) Cabbage, spinach, onions and other vegetables are now on the move. (b) Sweet corn acreage is increasing. Note: Louisiana soil is capable of producing early vegetables for the northern markets, to be followed by several more crops during the year.

9—Packaged ice sales are increasing by leaps and bounds, with a minimum of local advertising. (a) In general packaged ice is not priced sufficiently high. (b) The market for packaged ice has not yet been scratched in Louisiana.

10—Profits net are increasing due to elimination of price adjustments and non-profitable operations.

11—Many small plants are closing down after ice season's peak and purchasing ice from competitor at exchange prices.

12—Demand for ice by trucks transporting perishable produce is increasing all the time. Note: Few ice plants have proper facilities as yet for this type of business. Icing stations on the main highways to take care of this type of business would pay off, if properly advertised.

13—Tourist trade is poorly served. (a) Majority of ice plants are located off the highways. (b) Lack of proper outlets on main thoroughfares. (c) There are entirely too few highway signs advertising availability of ice.

14—Ice vending stations are profitable, if properly located and serviced.

15—Local advertising is much neglected.

It was generally conceded at these Louisiana Meetings that the ice industry has no more problems than any other industry of comparable size. We need imagination, plenty of hard work and adequate local advertising to regain our lost prestige.

## California Association of Ice Industries

JACK L. DAWSON, Exec.-Mgr.

THE California Association of Ice Industries had a Board of Directors meeting on February 10 concerning, among other things, the proposed activities of the Association for the year 1953.

It was the unanimous opinion of the Board that the association should forego this year's annual convention and in lieu thereof hold district merchandise forum meetings at Sacramento, Los Angeles and San Francisco. It is felt that these forum meetings will be of more value to the industry as a whole than would a convention at this particular time. It is their purpose through these meetings to gain the membership and support of small distributors who have come into the picture within the last two years.

The first forum meeting will be held in April at Sacramento, Calif.

# North Carolinia Annual Convention

THE annual convention of the North Carolina Ice Association was held at the Robert E. Lee Hotel, Winston-Salem, N. C. March 9 and 10. All features of the convention, including the business sessions and entertainment were considered very successful.

Opening Monday morning the first session was used for the president's report and other convention business. Most of the afternoon session was taken up with an open forum discussion on various phases of the ice business, automatic vending machines, uniforms for delivery men, 24-hour service, and problems in production.

### Advertising

The forum was led by David J. Copeland, vice president of the American Service Company at Atlanta, Ga. Mr. Copeland told the group that advertising was one of the main things to be stressed by modern ice companies, making the public more conscious of the need for and uses of ice.

Going into the second day the icemen had as guest speakers: Waldo Cheek, North Carolina Commissioner of Insurance; Wilford G. Jones, safety director of R. J. Reynolds Tobacco Company; Dr. Frank Goodwin, professor of marketing at the University of Florida.

### Insurance Rates

Commissioner Cheek emphasized that the rates for insurance are made by the losses in North Carolina. "By reducing losses," he said, "we can thereby reduce rates." He pointed out that the present trend of automobile liability rates was upward because of the wrecks and losses on the state's highways. On the other hand, the trend in fire insurance rates is downward, because "several years ago the fire underwriters learned how to prevent fires. If we are able to do the same on our highways," he said, "then we can get the automobile liability rates down.

Mr. Jones spoke on "General Tips for Accident Prevention."

### Accident Prevention

Dr. Goodwin stressed the point that, in order to be successful every modern company must have a public relations program. "There was a time," he said, "when it was probably true, that if you built a better mousetrap the world would beat a path to your door. But that is only half the problem now. The other is to let the people know you are building that mousetrap."

Public relations he defined as giving the public all the information, ideas and attitudes it needs to form as fav orable opinion of you as you deserve. And he emphasized the word "deserve," pointing out that in times past companies glossed over their shortcomings. "That is an antiquated concept. First, you deserve favorable public opinion and then give to the public the things it needs to form as favorable opinion as you deserve."

He went on to say that the public forms its attitude at the point where it has personal contact with the company, which makes everyone who works for the company a public relations representative as far as attitude is concerned. Speaking of the independent small business, he said the strength of independent businessmen today lies in associations such as the North Carolina Ice Association.

The banquet and dance were a huge success, a good time being had by all.

Officers and directors for 1953 were elected as follows:

### Officers

President, L. E. Geddie, Mount Olive.

Vice-president, J. M. Freeman, Burlington.

Secretary-treasurer, Lewis H. Powell, Raleigh.

Directors: C. L. Thompson, Roanoke Rapids; Raymond C. Hall, Monroe; E. L. Lowis, Gastonia; Bryan L. Bellenger, Lincolnton; W. H. Sherrill, Hickory; Harvey Johnson, Hamlet; M. R. Sanders, Southport; John Cross, Elizabethtown; B. A. Barrosse, Asheville; George L. Bent, Wilson; W. E. Brown, Jacksonville; Garr Price, Leaksville.

## Indiana Association of Ice Industries

ROBT. WALTON, SECRETARY

AT A RECENT meeting of the Board of Directors, it was voted to return the annual convention of the Indiana Association of Ice Industries to Indianapolis and the Lincoln Hotel. It was felt that the central location of Indianapolis plus a streamlined-idea packed program would best serve the needs of the Indiana Ice Industry. The convention will commence at noon on April 15 with one and one-half days of business sessions.

The program committee is planning a real down-to-earth business program. There will be few formal speeches, as almost the entire program will be discussion, open forum type of meeting. It has been proven that these idea packed sessions are the most valuable to all ice men since they pick up ideas that will pay dividends in 1953.

The social program will be ample—providing for renewal of old friendships with an intimate atmosphere prevailing. We are certain that the day and a half visit to Indianapolis will be most profitable and enjoyable.

The first cycle of the Association's 1953 training program has been completed. Comments on the value of the latest program have all been favorable. Some say it was the "best yet." We are now starting on the second cycle in northern Indiana and we urge those who have not as yet made arrangements to attend to do so. We are sure you will have no reason to regret it.

## Southwestern Ice Manufacturers' Association

THE San Antonio Convention of the Southwestern Association, April 8-10 will use two sessions, one full day, for floor reports and discussions of current problems and headaches. There will be no set speeches, just business. Among the subjects suggested for discussion are: Development of sidelines or outlets; processed ice; poultry processing plants; domestic deliveries; vending machines; economies of operation; labor; future of the ice market.

San Antonio members will be hosts at the Convention's "Cut-Up" Party, including dinner, beginning at 7:30 p.m., Thursday, April 9, at the new elaborate lake, picnic grounds and pavilion of the Lone Star Brewery. There will be Mexican food and motifs, draught beer, dancing. It will be informal, with sport clothes, sombreros, cowboy or cowgirl outfits, mantillas and serapes.

The President's annual dinner, floor show and dance will close the Convention Friday evening, April 10—dinner promptly at 7:30, up to the finest Gunter and San Antonio tradition — floor show by the only and inimitable International Revue with music by Eduardo Martinez' International Orchestra.

Mrs. Inez Irvine, charming "First Lady," will give her tea for all the ladies of the Convention, in the attractive setting of the Gunter's North Terrace, Thursday afternoon from 3:30 to 5:00. For ladies this will be a beautiful, joyful affair in the Spring motif and in every beautiful detail in harmony with the spirit of the April in San-Antonio Convention.

# Refrigerated Warehousing Industry

NATIONAL ASSOCIATION of REFRIGERATED WAREHOUSES

Division of American Warehousemen's Association

*Executive Offices*
TOWER BUILDING, WASHINGTON 5, D.C.

*Executive Vice-president*
WM. DALTON, WASHINGTON, D.C.

*Secretary*
JOS. H. COLQUITT, WASHINGTON, D.C.

*President*
A. B. EPROYMSON, CLEVELAND, OHIO

*Vice-president*
R. M. CONNER, CHICAGO, ILL.

*Treasurer*
CHAS. B. HART, TACOMA, WASH.

## THIS MONTH IN BRIEF

The annual AWA-NARW conventions to be held at Washington D. C., the week of May 17 has attracted a good advance registration and the usual practical program is promised, consisting largely of panel discussions of the more pressing problems.

With frozen foods topping all other commodities stored in public refrigerated warehouses, the joint panel discussion participated in by refrigerated warehousemen and frozen food interests at the frozen food convention resulted in an interesting session and an airing of mutual difficulties.

A modernization and expansion program, with addition of new freezer space, has been completed by the Minneapolis Cold Storage Company.

Report of cold storage holdings for February 28 shows a slight increase of cooler occupancy and a somewhat larger increase of freezer occupancy.

# AWA-NARW Conventions Promise Full Program Practical Business Benefits Based on Panel Type Discussions

LATE word from the NARW office in Washington indicates that the population of our Nation's Capitol will be swelled by a record breaking number of warehousemen from all sections of the country come the week of May 17. Advance registrations indicate the largest turnout in the history of AWA Conventions.

William (Bill) Dalton, general secretary of AWA reports that "over 500 advance registrations have already been received with more coming in every day." The site of the AWA Convention is the Shoreham Hotel, Washington, D. C., May 17-21.

Convention committeemen say that program planning is in full swing with emphasis being placed on extracting as many "pants pocket" benefits from convention sessions as possible. NARW, a division of AWA, is again featuring all panel type discussions, which proved so popular at last year's meeting.

### Panel Discussions

Theme of these panels will be a constructive and down to earth discussion of all phases of refrigerated warehouse operations. Discussion topics up for tentative consideration are packaging, cost accounting, public relations, materials handlings, labor, new products and office procedures.

### Materials Handling

Running simultaneously with the AWA Convention is the National Materials Handling Exposition in Philadelphia, May 18-22. Knowing that some warehousemen will want to combine two trips in one by taking in the Convention and the Exposition, AWA headquarters has made arrangements with the Exposition management to designate May 22 as American Warehousemen's Association Day. Exhibits of materials handling equipment of special interest to refrigerated and merchandise warehousemen will be featured.

New models of materials handling equipment will be shown, valued at more than 10 million dollars.

### Judd Main Speaker

Main speaker at the AWA Convention will be Rep. Walter Judd (R-Minn.)—one of the country's most outstanding orators and a nationally recognized authority on foreign affairs. He will speak at the Farewell Luncheon on Thursday, May 21.

An adviser to the present administration on foreign policy and a member of the House Committee on Foreign Affairs, Rep. Judd is expected to give AWA'ers a behind-the-scenes look at current developments in the extremely important field of international relations.

Another outstanding speaker scheduled is Roger Fleming, Secretary-Treasurer of the American Farm Bureau Federation. He will speak at an NARW session on Wednesday, May 20.

NARW Associate Members are urged to take advantage of the excellent exhibiting facilities being offered to them at this year's Convention. Full details can be obtained from AWA headquarters.

All warehousemen are urged to send in their registrations now. Make every minute spent at the convention count. Avoid those long registration lines.

### T R R F Sessions

As usual, a pre-convention activity of interest to a growing number of warehousemen, will be the annual meetings of the Refrigeration Research Foundation. These will start Friday, May 15 with an open session of the Scientific Advisory Council, continuing Saturday, and the annual membership meeting, Sunday, May 17.

# Panel Discussion Covers Problems of Warehousemen - Frozen Foods

WITH frozen foods topping all other commodities stored in public refrigerated warehouses last year, Operation Zero took on added importance at the All-Industry Frozen Food Convention, held in Chicago March 1-5. The panel discussion following a Dutch Treat luncheon was sponsored by the National Association of Refrigerated Warehouses, Wednesday, March 4 at 12:30 pm. in the Boulevard Room of the Conrad Hilton Hotel.

Because of the outstanding success of this informal give-and-take session at the Convention last year, President A. B. Efroymson of NARW appointed Harold C. Emerson to again moderate and Chairman the luncheon and afternoon agenda. Mr. Emerson is vice-president and general manager of the Cumberland Warehouse Corporation, Bridgeton, New Jersey, and a member of the NARW Executive committee.

Panel members representing the refrigerated warehousing industry were: F. D. Newell, Jr., Minneapolis, Minn.; and M. W. Young, San Francisco, Calif. Representing the distributors was W. L. Pavlovski, Chicago, Ill., president of the National Wholesale Frozen Food Distributors. G. D. Mentley and F. C. Filippone, New York City gave the packers viewpoint, and Jerry Hetfield, Chicago, Ill. represented the brokers.

### Panel Discussion

Answering a question on mixed-car shipments, it was brought out that such shipments enable packers and distributors to supply customers in accordance with their needs, rather than making it necessary for them to accept an over supply.

While uniform sized packages are preferred by all members of the trade, especially warehousemen, there are some products that will not fit. A dozen small items for instance will not occupy all the space in a carton designed for larger items.

Packages should have more structural strength for palletized handling. It was suggested that the ordinary shipping carton could be reinforced to provide the needed strength.

A question as to who has first lien on merchandise in a refrigerated warehouse is answered by terms stated in the warehouse receipt. Common practice usually grants the warehouseman such rights.

A number of distributors, it was reported, have installed their own freezer and storage space. It was pointed out that unless distributors have need for such facilities on a year-round basis, it would be more profitable for them to use this money for inventory and other phases of their business.

Leading packers report considerable progress has been made in combining packages by strapping them together. One method used is the so-called bundle wrap, in which a dozen small packages are tied together. This definitely is desired by warehousemen because it reduces handling costs.

### Rates on Frozen Fish

Rates on frozen fish storage, it was pointed out, are higher than for frozen fruits and vegetables on the theory that fish cannot be mixed with other products. A frozen food distributor however pointed out that the better fish packages, more nearly uniform in size and well wrapped, do not require segregation. Fish products formerly were packaged in odd shapes and had an odor, but proper wrapping and packaging now does away with these objections and there no longer is a reason for plus rates. On this question also a warehouseman expressed the view that the most efficient sizes for fish packaging is 20 to 30 pounds and that the package must be strong enough to stand up under handling. If there is any odor, that adds to the risk factor. The custom of segregation has led to a lower occupancy and this, together with other risk factors, has tended to keep the storage rates up.

The question of whether refrigerated warehousemen make sufficient profit on frozen foods in comparison with other commodities, brought the reply that frozen food interests sometimes feel that rates, particularly on mixed shipments, are too high, but this is affected by rising costs of labor. Anything that will reduce handling costs will tend to hold down rates, it was stated.

As an added service, most warehousemen are providing break-up space for distributors, although this service is limited in some cases because of lack of facilities.

A point raised last year was repeated, that packages are so covered by advertising and product name that inadequate space is left for marking in the warehouse. The viewpoint of the packers is that this advertising has value, particularly in the retail store, the mere repetition of the brand name providing publicity. It was suggested that a uniform commodity code, with possibly a distinctive color for each main product, would be advantageous.

A warehouseman, it was stated, can limit the value of a commodity by listing its value in the warehouse receipt. However the customer may require that its full value be stated.

A complaint was registered by a packer representative that more promptness is needed in the furnishing of withdrawal, and warehouse receipts, and other records. This is important to them in enabling them to get out their bills promptly. Some delays, it was stated, occur in the mails but otherwise, the warehousemen say, their practice is to handle these records as promptly as possible.

## Price and Wage Records Must Be Retained

ALL decontrolled industries have been cautioned against the premature disposal of records required under the price control program. Now that refrigerated warehousing is decontrolled, according to a notice from the National Association of Refrigerated Warehouses, records on transactions subsequent to February 18 (the decontrol date for warehousing) need not be kept; however the records formerly required under CPR-34 must be kept available for inspection. In general these records must be retained for a period of two years following expiration of the Defense Production Act.

The Wage Stabilization Committee advises that records required under the wage and salary regulations must be retained for a period of three years following the calendar year in which the last increase was granted under the regulations. For tax purposes however the Bureau of Internal Revenue requires that such records be retained for five years.

## North Atlantic Training Conference

THE North Atlantic Traing Conference, third in a series of three, will be given by The Refrigeration Research Foundation at the Sheraton-Belvedere Hotel, Baltimore, Md., April 12-16. Reservations to date are reported satisfactory. The first training conference was held at St. Louis, February 1-5 and the second at San Jose, Calif., March 15-19.

# Warehouse Expands Adds Freezer Space – New Records for Frozen Food Orders

A MODERNIZATION and expansion program that includes addition of 375,000 cubic feet of freezer space to present capacity has been announced by the Minneapolis Cold Storage, Minneapolis, Minn.

F. D. Newell and F. D. Newell, Jr., co-managers of the company, reported that two of five new freezer rooms, having 150,000 gross cubic feet capacity, already have been completed. Three others of the same size are scheduled for completion by June 1.

In addition to the enlarged freezer capacity that will give the company one of the largest facilities of its kind in the Northwest, the program calls for:

Extensive modernization of refrigeration machinery.

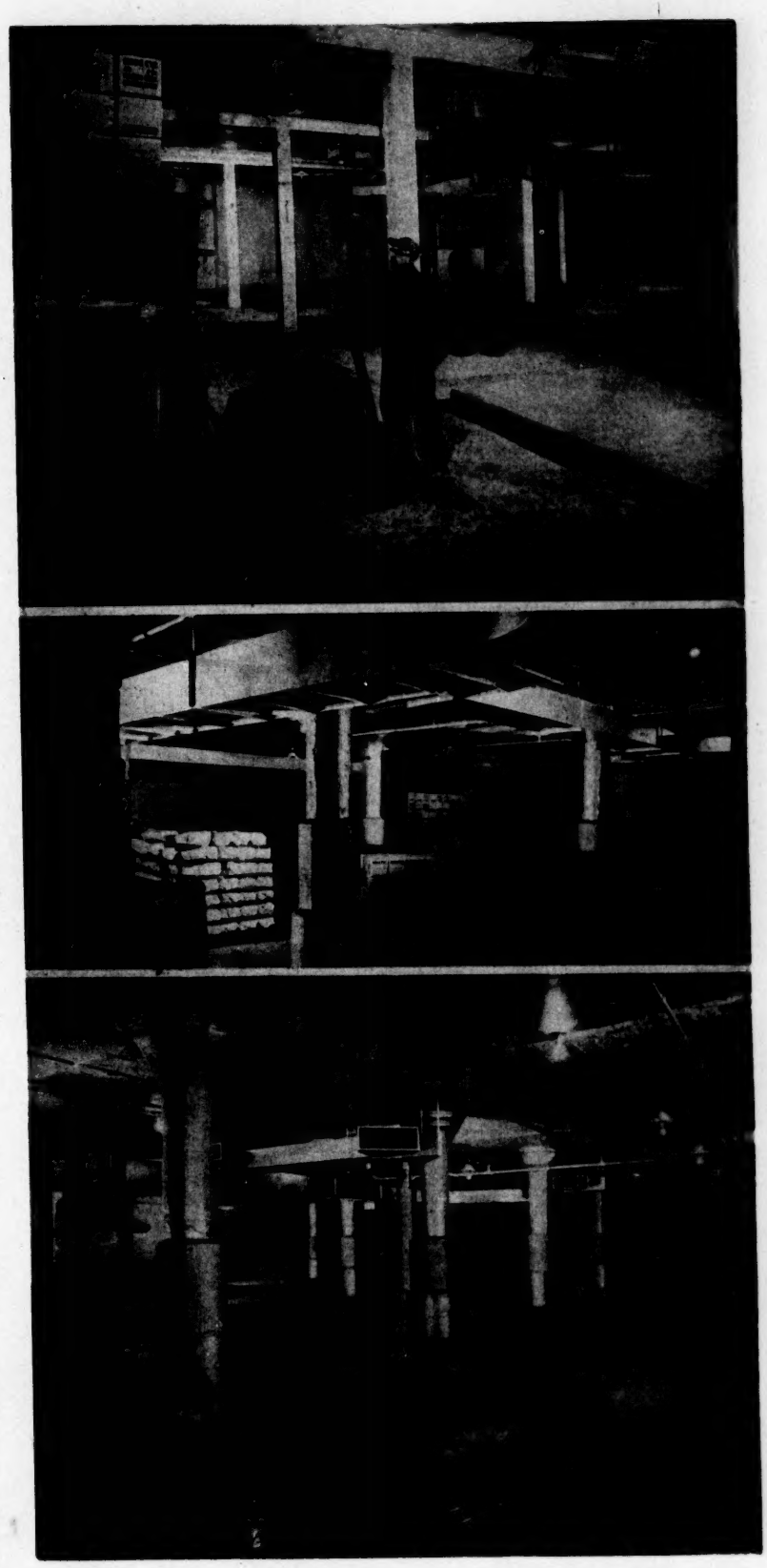
Installation of additional electrically-driven materials handling equipment. The new freezer rooms are designed for either full or partial palletized operation.

New order writing machines that will simultaneously calculate and post new balances on the lot record cards.

## New Machine Speeds Frozen Food Orders

Some warehouse accounting procedures were not designed to handle the heavy volume of distribution business which the frozen food industry now requires. Many of the packers are requesting warehouses to complete various withdrawal and inventory forms in addition to the warehousemen's r e g u l a r records. These machines are designed so as to provide a duplicate copy of the transactions that occur on each lot of merchandise for the month. In other words, the principal will receive a printed record showing the date, withdrawal order number, and quantity of each transaction during the month without warehouse employees doing any additional work.

The machine is double carriage. The order goes into left hand carriage; the lot card into right hand carriage; balance from lot is entered into machine; the order is written, and extension and postings are done automatically.



*Storage rooms in new addition to Minneapolis Cold Storage.*

## Livestock Men Recommend End of Controls

A FLAT recommendation that Congress permit the price and wage control law to expire on April 30 and reject legislation now before it to provide stand-by controls or a 90-day freeze order was one of seven submitted to Secretary of Agriculture Benson by a Livestock Industry committee that concluded a two-day meeting in Washington March 12.

The 18-man committee surveyed the whole cattle picture, pointing out that producers and feeders have been pinched for more than a year in a falling market for their products while costs of production have remained at high levels. It commended the President and the Secretary for their prompt action in removing price and compulsory grading controls.

"Every possible approach to a solution of the problem was examined," according to the committee report, which continues, "including the idea of government subsidies and supports but rejected this approach as offering, at best, only a temporary relief for those now in financial difficulty. It was the committee's opinion that Government interference at this time would only further complicate the problems and delay the establishment of a sound operating program for the industry."

The committee did, however, spell out a field for Government aid in its remaining resolutions. It called for a stepped-up program of Departmental promotion through press, radio and television to acquaint the public with the fact that beef is both plentiful and low-priced on today's market.

A recommendation that the government give serious consideration to the purchase of beef to send to Korea for the feeding of the South Korean army pointed out that a better plan of nutrition will make more South Korean soldiers available for armed service.

## Otis Heads Committee On Medical Education

ARTHUR N. OTIS, president, Merchants Refrigerating Co., New York City, has accepted chairmanship of the Warehouse Industry Committee of the National Fund for Medical Education. Members of his committee will be representatives from the various branches of the warehousing industry. Their job is to help raise funds for improved medical education.—Cold Facts.

## Montreal Storage Report

MONTREAL Refrigerating & Storage, Limited, Montreal, Canada reports net income of $100,-310 for the year ended December 31, 1952. This is equal, after preferred dividends, to $2.21 per share on 37,000 common shares, and compares with net of $95,700 or $2.58 a share of common in 1951 when there was no cash preferred dividends.

At the end of 1951 the company issued 37,000 shares of a $10 par preferred stock to common shareholders as a capitalization of undistributed income. Dividend payments in 1952 on these shares amounted to $18,500 and the shares were redeemed on December 31, 1952. Cash dividends of $1.50 per share were also paid on the common stock in each year.

W. G. Lasher, president, states that the slightly better financial results realized in 1952 resulted from a lower charge made by the company to depreciation reserve and certain nonrecurrent storage earnings. He states that the operating outlook for 1953, "though not indicative of increased tonnage, gives no immediate cause for concern."

## Uniform Commercial Code In State Legislatures

THE uniform commercial code has been introduced in the legislatures of several states including New York, Texas, Oregon and Massachusetts. The New York bill was introduced early last year but no action was taken and at last reports it had not been reintroduced. In the case of Texas, Oregon and Massachusetts, it has been referred to committees for study. A group in Wisconsin is reported working on a resolution to set up a study committee to report back to the legislature of that state in November 1954. This Code is of vital importance to every warehouseman and is one of the many subjects which will be discussed at the AWA Convention in May.—Cold Facts.

## Keefe Moves Up

JOHN D. KEEFE, JR. has been appointed assistant general manager Cumberland Warehouse Corp. Bridgeton, New Jersey, according to an announcement by H. C. Emerson, vice-president and general manager of warehousing operations for Seabrook Farms. Associated with Cumberland for the past eight years, Mr. Keefe brings both wide experience and enthusiasm to his new job.—Cold Facts

## Studies on Sugar Bloom On Refrigerated Candies

A NEW research project at the Georgia Experiment Station on prevention of sugar bloom on refrigerated candies, is getting off to a nice start, according to a recent report from Dr. J. G. Woodrooff, project leader. Philip Gott, National Confectioners' Association, has arranged for supplies of chocolate candies of assorted kinds to be shipped by various manufacturers for the first phase of the studies. Also, various kinds of wrapping materials will be supplied by packaging materials manufacturers and converters. In the first phase, boxed candies in various wrappings will be stored at three temperatures (including 0 F). After one or two months, they will be removed, wrapped in plain paper and held at room temperature for a short period and then examined. Other phases of the study will depend on results of this first phase. —TRRF Bulletin.

## New Cold Storage Plant

A NEW cold storage plant has just been completed at a cost of $600,000, for Pacific Cold Storage Inc., at 2851 East Forty-fourth Street, Los Angeles. The plant will serve wholesale fruit, produce and meat packers, it was said by John Gogian, president of the firm. Other officers are Hazel K. Gogian, vice-president; George Gogian, treasurer; and Floyd C. Hood, secretary and gen. mgr.

Designed by industrial Architects and Engineers Thomas C. Kendall Company, and erected by Contractors Trewhitt, Shields and Fisher, of Fresno, the new plant provides 500,000 cubic feet of storage space and is capable of handling 233 carloads of perishable goods. The cooling and freezing system was installed by the Ralph E. Mannis Company of Wilmington and San Francisco.

## Necessity Certificates Increase Storage Space

A TOTAL of 31,642,600 cubic feet of refrigerated storage space has been authorized under necessity certificates and/or CMP according to DTA records. This figure includes both new construction and conversions and involves a total investment of $31,932,985, exclusive of land and materials handling equipment. Of the 67 projects involved, 18 were on the west coast, 14 in the South Atlantic States and 10 in the Middle Atlantic States. The remaining 25 projects were scattered in 16 different states—Cold Facts.

# February 28 Cold Storage Holdings

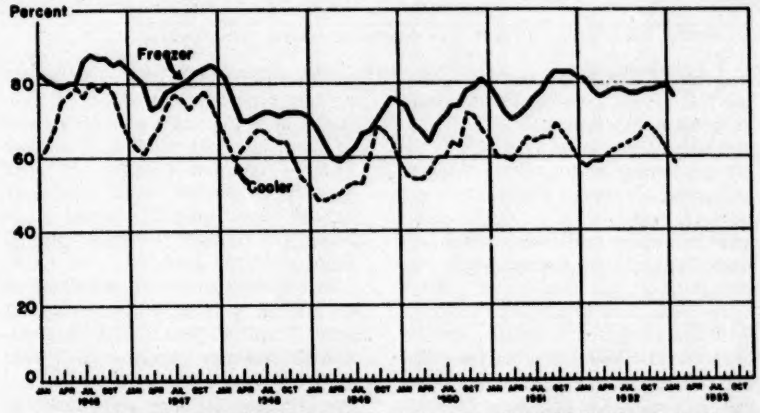
PUBLIC refrigerated warehousemen reported their cooler space to be 58 per cent occupied on February 28, according to reports tabulated by the Department of Agriculture. On the same date, freezer space was 76 per cent occupied. This compares with 57 and 81 per cent reported last year for cooler and freezer space respectively, while the 5-year average occupancy for this time of year is 57 and 76 per cent respectively.

The seasonal decline in cooler utilization, 3 points, was less than average but greater than the decline last year. On the other hand a greater than average decline in freezer use was reported last month, 3 points vs. 2 points, which brought freezer occupancy down to a level below last year this time but equal to the 5-year average for the month.

Cooler space appeared to be readily available in all states with only Minnesota, Georgia, Alabama and Mississippi, reporting an occupancy in excess of 80 per cent. Although national use of freezer space was below 85 per cent, warehousemen in some states of the East North Central, South Atlantic, and East South Central regions indicated utilization of their freezer space to be in excess of 85 per cent.

February net withdrawals of cooler stored commodities equaled 295 million pounds or a net reduction of 16 per cent since the end of January. Although the seasonal decline was about equal to the change last year and the average February net reduction, total stocks in store, 1.6 billion pounds, were below last year's stocks and average February 28 holdings by 3 and 13 per cent respectively. Products moving from freezer storage during February, fruits, vegetables, cream, poultry, and some meats, more than offset the seasonal gains in holdings of butter, frozen eggs, pork, lamb and mutton and by the end of February total holdings in freezer space were down to 2.3 billion pounds. The quantity in storage, however, surpassed all previous records for this time of year.

Net withdrawals of fresh apples from storage during February totaled 4 million bushels as compared with 5 million last year and 6 million during February in the 5-year period ended 1952. With almost 11 million bushels still in store, current holdings were less than average for this time of year but about equal to the stores last year. Stocks of pears were halved during February and by the end of the month totaled less than one half million bushels. Holdings of fresh grapes on February 28 were down to 13 million pounds; onions fell off 13 million pounds to 40 million. Onion stocks in the Middle Atlantic States totaled 17 million pounds while Pacific Coast States held 15 million pounds.



END OF MONTH OCCUPANCY OF PUBLIC COLD-STORAGE WAREHOUSES, 1946-53

TABLE 1—COLD STORAGE HOLDINGS IN PUBLIC, PRIVATE AND SEMI-PRIVATE WAREHOUSES, APPLE HOUSES AND MEAT PACKING PLANTS (000 LBS.)

| | Feb. 28 1953 | Jan. 31 1953 | Feb. 28 1952 | Five-year Average |
|---|---|---|---|---|
| Beef | 253,517 | 263,921 | 253,983 | 164,207 |
| Pork | 609,071 | 595,546 | 973,870 | 663,956 |
| Other Meats and Meat Products | 185,430 | 178,563 | 161,930 | 147,276 |
| Frozen poultry, lbs. | 217,020 | 261,072 | 270,397 | 233,362 |
| Creamery butter, lbs. | 100,817 | 85,737 | 7,879 | 33,863 |
| American cheese, lbs. | 185,491 | 194,286 | 142,945 | 126,798 |
| Other cheese ,lbs. | 17,075 | 19,565 | 15,806 | 14,611 |
| Shell eggs, cases | 248 | 120 | 942 | 471 |
| Frozen eggs, lbs. | 42,123 | 34,980 | 60,576 | 69,146 |
| Apples, bu. | 10,810 | 15,265 | 10,753 | 13,796 |
| Frozen fruits, lbs. | 229,965 | 264,350 | 267,022 | 261,692 |
| Frozen vegetables, lbs. | 448,012 | 494,893 | 398,699 | 297,732 |
| Frozen fish, lbs. | 141,378 | 170,263 | 128,704 | 106,597 |

National holdings of frozen fruits were reduced to 230 million pounds by the end of February as the result

TABLE 2—PERCENTAGE OF SPACE OCCUPIED BY PUBLIC COLD STORAGE WAREHOUSES (APPLE HOUSES EXCLUDED)

| | Net piling space (000 cu. ft.) | | Feb. 28, 1953 (%) | | Jan. 31, 1953 (%) | | Feb. 28, 1952 (%) | | 5 year Average (%) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Cooler | Freezer | Cooler | Freezer | Cooler | Freezer | Cooler | Freezer | Cooler | Freezer |
| New England | 2,614 | 6,242 | 33 | 69 | 36 | 73 | 45 | 81 | 49 | 78 |
| Middle Atlantic | 29,791 | 35,471 | 51 | 75 | 59 | 77 | 54 | 80 | 54 | 74 |
| East North Central | 27,107 | 26,948 | 62 | 84 | 62 | 86 | 61 | 86 | 60 | 79 |
| West North Central | 11,405 | 20,017 | 52 | 79 | 57 | 82 | 63 | 90 | 63 | 88 |
| South Atlantic | 9,449 | 11,166 | 62 | 81 | 65 | 75 | 60 | 84 | 56 | 81 |
| East South Central | 2,201 | 3,373 | 77 | 86 | 72 | 87 | 65 | 87 | 65 | 84 |
| West South Central | 7,188 | 8,583 | 73 | 74 | 74 | 75 | 63 | 63 | 63 | 66 |
| Mountain | 1,404 | 3,023 | 56 | 73 | 54 | 77 | 67 | 91 | 61 | 77 |
| Pacific | 15,918 | 27,797 | 60 | 69 | 60 | 75 | 49 | 71 | 59 | 67 |
| United States | 107,075 | 142,619 | 58 | 76 | 61 | 79 | 57 | 81 | 57 | 76 |

TABLE 3—PERCENTAGE OF SPACE OCCUPIED BY PRIVATE AND SEMI-PRIVATE REFRIGERATED WAREHOUSES AND MEAT PACKING PLANTS (APPLE HOUSES EXCLUDED)

| | Private and Semi-Private Warehouses | | | | | | Meat Packing Establishments | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Net Piling Space (000 cu. ft.) | | Space Occupied—per cent | | | | Net Piling Space (000 cu. ft.) | | Space Occupied—per cent | | | |
| | | | Feb. 28, 1953 | | Feb. 28, 1952 | | | | Feb. 28, 1953 | | Feb. 28, 1952 | |
| | Cooler | Freezer | Cooler | Freezer | Cooler | Freezer | Cooler | Freezer | Cooler | Freezer | Cooler | Freezer |
| New England | — | — | — | — | 50 | 50 | — | — | — | — | — | — |
| Middle Atlantic | 1,423 | 1,167 | 37 | 79 | 39 | 73 | 844 | 186 | 93 | 63 | 82 | 86 |
| East North Central | 2,959 | 5,131 | 68 | 65 | 73 | 56 | 3,346 | 680 | 87 | 73 | 86 | 96 |
| West North Central | 485 | 1,889 | 51 | 70 | 74 | 75 | 3,470 | 1,451 | 80 | 95 | 90 | 94 |
| South Atlantic | 121 | 5,454 | 23 | 57 | 66 | 69 | 413 | 124 | 96 | 100 | 74 | 100 |
| East South Central | — | — | — | — | — | — | — | — | — | — | 93 | 93 |
| West South Central | — | — | — | — | 85 | 90 | — | — | — | — | 100 | 100 |
| Mountain | — | — | — | — | — | 20 | 166 | 107 | 100 | 100 | — | — |
| Pacific | 2,137 | 4,179 | 48 | 48 | 29 | 56 | 453 | 73 | 100 | 100 | 100 | 100 |
| United States | 7,125 | 17,820 | 54 | 60 | 52 | 65 | 8,692 | 2,621 | 86 | 88 | 88 | 95 |

NOTE: Blank spaces indicate that insufficient returns were received.

of a 34 million pound reduction during the month. This compared with a 36 million net withdrawal last year and 28 million during February in the 5-year period ended 1952. Without exception, all frozen fruit items were in lesser supply than a month earlier. The reduction in frozen strawberry stock, 17 million pounds, was the largest of all, followed by a 6 million pound reduction in stocks of cherries. With the exception of frozen peaches, blackberries, and strawberries holdings of all frozen fruit items were below average for this time of year.

Frozen vegetable stocks at 448 million pounds were about 49 million pounds greater than the previous record high for this time of year. While the February net withdrawal was more than one-fourth greater than average, it was only about one million pounds greater than in 1952. Holdings of frozen peas fell off 18 million pounds to 106 million but were still at a record high for the month. Broccoli stocks reached an all time record high with almost 43 million pounds in storage. Holdings of cauliflower, pumpkin and squash, and spinach, each reached new highs for the month.

Orange concentrate holdings advanced to more than 19 million gallons as compared with 15 million last year. The February gain of more than 4 million gallons, however, was almost identical to the net increase of a year ago.

February reductions in stores of cream brought national stocks down to 10 million pounds which were about double the holdings last year and one-third greater than average.

Creamery butter stocks in storage increased 15 million pounds to almost 101 million pounds. The increase during February is in contrast to a decrease of 6 million pounds last year and an 11 million pound average decrease during February in the 5-year period ended 1952.

National holdings of butter were the second largest on record for February 28 being only about 7 million pounds below the record February high reached in 1944. American cheese holdings were also at a new high for the month with 185 million pounds reported in storage on February 28. A February gain only equal to about one-half the 5-year average brought national holdings of shell eggs up to 248,000 cases. Last year, 942,000 cases were in storage while average holdings for this time of year is 471,000 cases.

Frozen egg holdings advanced to 42 million pounds which compares with 61 million pounds last year. Although the net increase in frozen egg stocks was more than three times the average February gain, holdings were about 40 percent less than average.

Frozen poultry stocks reflected a 44 million pound net reduction during February to bring stocks down to 217 million pounds. The February net reduction which was equivalent to 17 percent compares with 10 percent in 1952 and 12 percent during the 5-year average period ended 1952. Stocks of fowls were down 10 million pounds to 39 million, while turkey holdings fell off 26 million pounds to 117 million pounds.

National holdings of beef, moving in accordance with its 5-year average pattern, decreased 10 million pounds to 254 million pounds. However, this seasonal change was in contrast to last year's movement at which time stocks increased during February by 14 million pounds. Stocks of pork amounted to 609 million pounds on February 28, an increase of 14 million pounds over the previous month. This net gain compares with 89 million in 1952 and 24 million during February in the 5-year period ended 1952. Total meat stores amounted to over one billion pounds—a net gain of 10 million pounds since January 31. Last year, total meat stores reflected a gain of 113 million pounds while the average January to February increase is 17 million pounds.

Net withdrawals from storage during February reduced national holdings of fishery products to 158 million pounds. Of this amount 141 million pounds were frozen fishery products; the balance, 17 million pounds, was comprised of cured fish in storage. Current holdings of frozen fish compares with 126 million in store last year and 107 million on hand February 28 during the 5-year period ended 1952.

### Storage Outlook

A continued decline in cooler occupancy is expected if the 5-year average pattern prevails during March. According to past performance a decline of one point is expected although in March last year there was an increase of two points. The freezer occupancy decline during February was greater than average and, during March, occupancy is expected to continue on its downward cycle. If the average decline prevails during March, 4 points, it would bring freezer occupancy down to a level to that reported on March 31 during the 5-year period ended 1952.

## Florists Offer New Business

THERE may be new business for refrigerated warehousemen in the storage of florists' stocks according to a note in a recent Cold Facts Bulletin. The American Association of Nurserymen is calling attention of its members to the advantage of cold storage in retarding growth or wilting of plants and flowers. Warehousemen are advised to discuss the possibilities with nurserymen in their area.

## Storage of Shrimp on Ice

STUDIES conducted by Dr. E. A. Fieger at Louisiana State University in Baton Rouge indicate that holding time for freshly caught shrimp in ice is preferably limited to four days. After four to six days of ice storage, the shrimp lose their characteristically sweet taste. Some physical changes have been under observation which take place after about six days and it seems to Dr. Fieger that enzymes present in the shrimp may be at work, causing a reduction of flavor quality well in advance of bacteriological action.—TRRF Bulletin.

# Practical Refrigerating Engineer

NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS

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OPERATING

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The problem of blower coil design and selection for proper humidity control was discussed in a recent NAPRE convention paper by D. D. Wile, chief engineer Refrigeration Engineering Inc., Los Angeles, Calif. The author has had a broad experience in both the practical and theoretical phases of refrigeration and air conditioning.

News letters from Chapter secretaries show interested activities from many sections and a growing consciousness of the value and need for the work the NAPRE is doing.

# Blower Coil Design and Selection For Proper Humidity Control


D. D. WILE, Chief Engineer
Refrigeration Engineering, Inc.
Los Angeles, Calif.


HUMIDITY within a refrigerated space depends upon the balance between rate of removal and rate of supply of moisture within the space. Moisture removed from the air as it passed over cooling surfaces is evidenced by condensate or frost accumulation. Moisture may be supplied to the space by (1) evaporation from exposed surfaces of moist product, (2) infiltration or leakage of humid air from the surrounding space and (3) occasionally, by rehumidification with water or steam sprays.

At this point it might be well to compare the problem of humidity control in a refrigerator with that of an air conditioning system. It so happens that low humidities are desired for comfort air conditioning, but the engineering problems are similar. The rate at which moisture is removed by a blower coil or other cooling surface can be accurately predicted whether the application is for comfort cooling or refrigeration of perishables. The gain of moisture from people and various other sources in an air conditioning installation is well established with the result that humidity can be accurately predicted in advance.

Not so fortunate is the refrigeration engineer. Little or no data is available on moisture release from various product surfaces. Infiltration of outside air into a refrigerator is also an unknown factor with wide variations depending upon type and quality of construction. We thus are confronted with the situation where dependable information is available on how much moisture will be removed by the cooling coil but with little knowledge of how much moisture will be released in the refrigerated space. Accurate determination of humidity depends on a knowledge of both these factors.

An NAPRE Convention paper.

The author of this article has had a broad experience in both the practical and theoretical phases of refrigeration and air conditioning, having held positions as chief engineer of the refrigeration and air conditioning division of the Detroit Lubricator Company, chief engineer of the refrigeration division of Savage Arms Corporation, and manager of development laboratories of Carrier Corporation. He is a graduate of the University of Kentucky, college of engineering. He holds the honor of being a fellow member of the American Society of Refrigerating Engineers, is a director of that Society, chairman of its General Technical Committee and recipient of the Society's Wolverine Award for outstanding publications in 1945 and 1951, being the only individual who has received that award twice. He is a member of the American Society of Heating and Ventilating Engineers and a registered professional engineer in the State of California.

Rooms designed for storage of unwrapped products either at high or low temperatures may give disappointing results when the rooms are only partially loaded since there is less moist surface available and dehydration will be proportionately

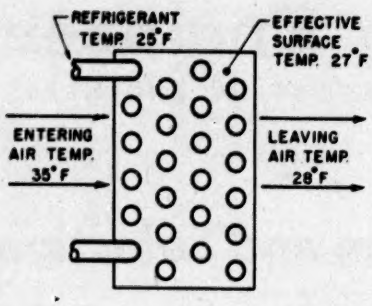


*Fig. 1—Principal resistance to heat flow is from the air to the coil surface, and then from the tube wall to the refrigerant, as shown in this diagram of a finned coil.*

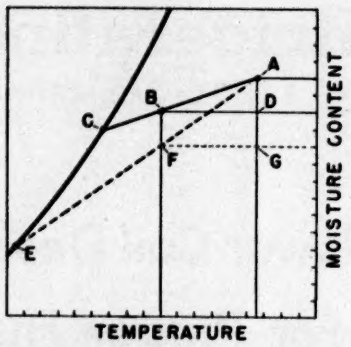


*Fig. 2—This simplified psychrometric chart demonstrates that low surface temperatures cause excessive removal of moisture.*

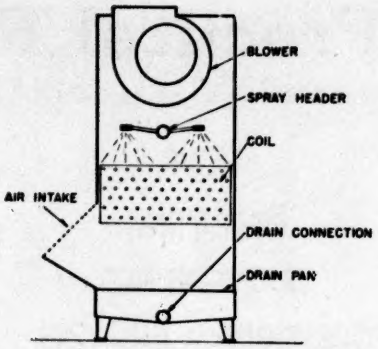


*Fig. 3—A floor type refrigeration blower unit using Water Defrost.*

greater. Rooms loaded with sealed products tend to operate at low humidity because there is no source of moisture. With some products such as whole eggs, little moisture is given off but it is desirable to maintain high humidity. This can usually be accomplished by proper cooling coil selection but sometimes requires rehumidification by water sprays.

We thus find occasional jobs that dehydrate the product excessively or, on the other hand, jobs that give trouble with water condensation on walls or slime formation. Such jobs with humidity too far below or too far above the desired level would be even more frequent except for experience and good judgment when selecting the equipment and the ingenuity of the operating engineer. Thus the control of humidity in refrigerated spaces is largely a matter of experience and good judgment rather than precise calculation. This does not mean that coil design can be ignored. Quite to the contrary, proper coil design and selection determine the rate of moisture removal and thus control the humidity level for any particular application. We thus can apply good engineering practice to at least one-half of our problem and depend upon experience and good judgment for the other half.

Coil performance is usually considered in terms of "T. D." or temperature difference between room air and refrigerant. This is satisfactory for overall performance but it is necessary to think in terms of the actual surface temperature in order to predict moisture removal and resulting humidity. With bare pipe the external surface can be considered the same as the refrigerant temperature for all practical purposes. With a finned coil the temperature will be slightly higher than the refrigerant temperature as indicated in Fig. 1.

With any type of cooling surface there is a definite relation between air quantity and the change in air temperature. Air circulation in a refrigerator might be considered like brine in a refrigeration system. The amount of heat removed by the brine depends directly upon the rate of flow and its temperature change. In a similar manner the amount of heat transferred from air to coil depends upon the flow of air and its temperature change. Thus there is a minimum air quantity that must be circulated for any particular operating condition.

With a well-designed coil operating at 10 degrees difference between air temperature and evaporating temperature, the air temperature will be reduced through a range of

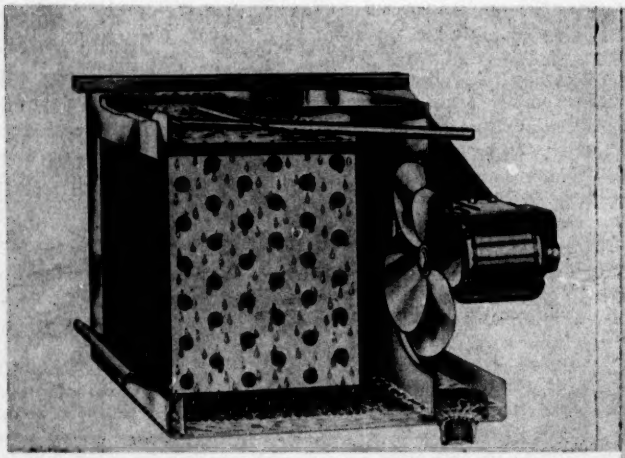

*Fig. 4 (above). With horizontal air flow as in this ceiling type water defrost unit, water is distributed over the coil by a perforated pan located above the coil.*

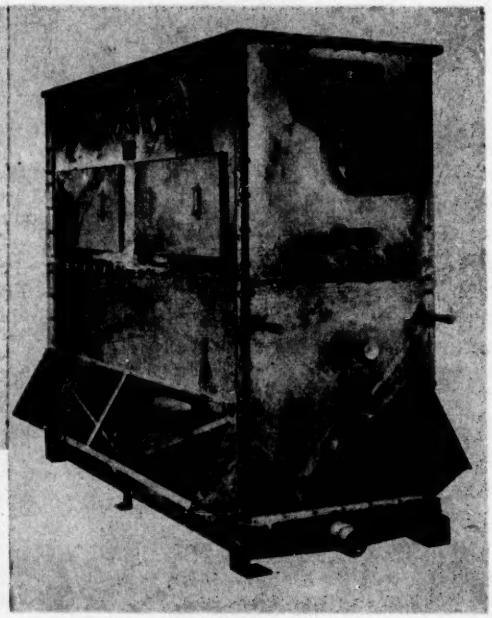

*Fig. 5 (right). Water defrost floor unit for use on military cargo vessels. Drain pan has large connections at both ends.*

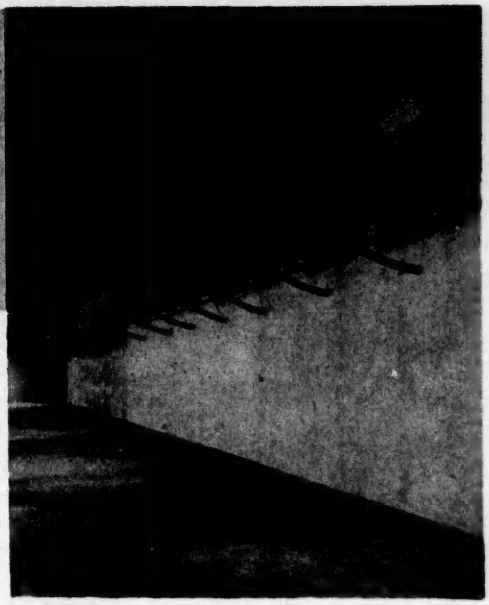

*Fig. 6 (above). The four ceiling units in this frozen food storage room remove so little moisture that defrosting is necessary only twice each week.*

*Fig. 7 (right). This room is 208 feet long by 98 feet wide. Water Defrost ceiling coils along one wall distribute air across the width of the room and maintain uniform temperature distribution.*

approximately seven degrees and the minimum air circulation will be approximately 1200 cfm per ton. Less air circulation would require a greater change in air temperature and correspondingly greater T. D.

The performance of the coil can now be represented on a simplified psychrometric chart, Fig. 2, where the vertical scale is moisture content and horizontal scale is temperature. Air entering the coil is represented by point A and the surface temperature by point C on the saturation curve. The air leaving the coil will be represented by point B on line AC. Temperature change of the air is represented by the length of line BD and the amount of moisture removed by length AD.

For purpose of comparison, assume that the refrigerator load and air flow through the cooling unit remains constant but a new coil is substituted having less surface area. The load can then be handled only by reducing surface temperature as indicated by point E in Fig. 2. Air leaves the unit at the same temperature (F and B are on the same temperature line) but its moisture content (point G) is considerably less than with the original coil. Thus for the same cooling load but with less cooling surfaces more moisture is removed and the humidity reduced.

Operating efficiency is also reduced by the necessity of maintaining a a lower refrigerant temperature. In addition to providing the proper amount of surface it is essential that all of the surface is effectively refrigerated. This requires proper design on the part of the manufacturer and proper application of refrigeration in the field. These conclusions are verified by innumerable field installations. High humidities are obtained by providing ample surface area.

It should be recognized that for a given amount of air flow there is a practical limit to the amount of surface that should be provided, beyond this point there is no real gain. In Fig. 1 the air temperature is shown leaving the coil only three degrees above the refrigerant temperature. If the amount of surface should be doubled, while the cooler handles the same load, the air would leave approximately one and one-half degrees above the refrigerant temperature and if it were doubled again this difference would be reduced to three-fourths degree. Thus increasing the surface area beyond a certain amount, meets with diminishing returns since a large increase provides only a small improvement in performance. The design of coils to maintain high humidity conditions must take these practical factors into consideration.

We occasionally receive requests for blower units built with bare pipe coils and upon inquiry find that the intended purpose is to maintain high humidity! Unfortunately the results would be exactly opposite to that desired due to the difficulty of providing sufficient bare pipe surface in a reasonable space.

With modern methods of defrosting, such as water defrosting, large surface areas can be built into compact and efficient blower units. A bare coil would occupy seven times the volume of a modern water defrost coil to produce the same cooling effect and humidity level. Before the time that modern defrosting methods were available it was necessary to have units with bare pipe coils so they could operate for long periods of time before shutting down for defrosting. This was especially desirable because of the long shut-down required to remove the frost. With present defrosting methods requiring only a few minutes shut-down, it is possible to provide ample surface in a compact and efficient blower unit. Better operating efficiency and higher humidity, as compared to bare pipe, can invariably be obtained.

The requirement for adequate surface area applies to any type of cooling surface including bare pipe coils, gravity circulation coils or blower units. As previously mentioned it is possible to build large amounts of surface in a blower unit without requiring excessive weight or size. As a result blower units have become a popular and accepted method of providing efficient and inexpensive refrigeration to all types and sizes of refrigerated spaces. With the development of modern defrosting methods, it has been possible to apply the advantages of the extended fin type blower units to low temperature applications.

Experience has developed certain "rules of thumb" for the application of blower coils that satisfy the usual operating conditions. These are shown in Table 1 where T.D. refers to the temperature difference between room air and evaporating refrigerant.

A typical water defrost floor unit is shown diagrammatically in Fig. 3. Water is sprayed over the finned coil by nozzles located in the space above the coil. Fans and refrigeration are shut off during defrosting

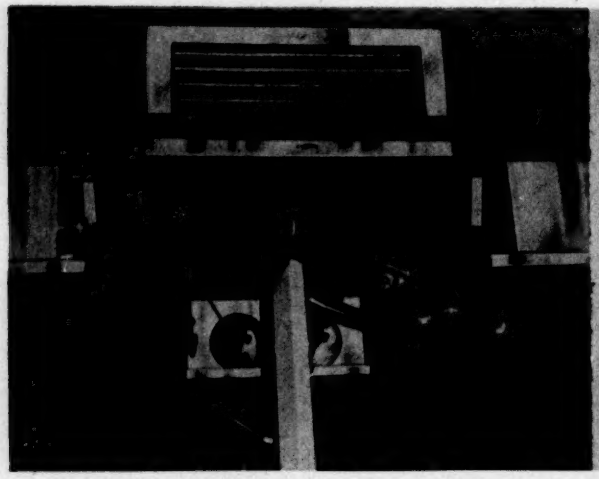

*Fig. 8 (above). In this apple storage warehouse it was more convenient to arrange the Water Defrost ceiling coils in clusters around building columns.*

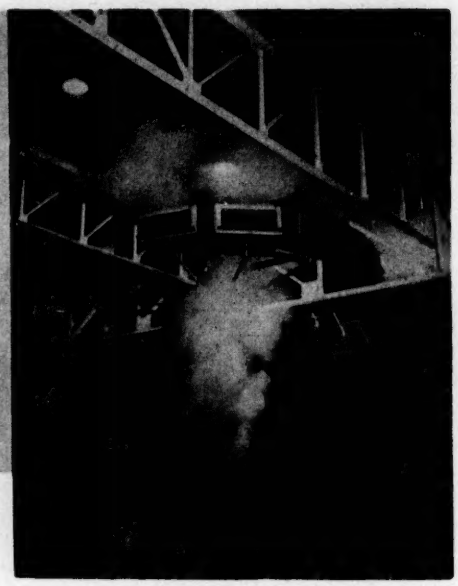

*Fig. 9 (right). This photo was taken during a smoke bomb test at the Alford Refrigerated Warehouse to determine air distribution from one of the many groups of ceiling coils.*

which usually requires only a few minutes.

With the ceiling type blower units, as shown in Fig. 4, water is distributed over the surface of the coil by means of a perforated pan located above the coil. Water is also applied to the return bends and refrigerant header at the ends of the coil by means of suitable distributing tubes.

TABLE 1—MODERN "RULES OF THUMB" FOR SELECTION OF COIL SURFACE APPROPRIATE TO MAINTAINING DESIRED HUMIDITIES FOR PERISHABLE COMMODITIES

| Product | Humidity Range | Approx. Humidity | T.D. |
|---|---|---|---|
| Unpackaged cheese, butter, cut fresh meats, flowers | Very High | 90% | 7° to 10° |
| Fresh carcass meat, fresh fruits and vegetables, fish and most general storage | High | 80% | 10° to 12° |
| Dried meats, dried fruits, dried vegetables, beef, milk and cream. | Medium | 75% | 12° to 15° |

For low temperature refrigerators (+10 F. or below), the T.D. is generally selected at 10 degrees or less in order to improve compressor efficiency as well as to control humidity.

Water defrosting has been applied to almost every conceivable type of service including sea-going vessels. The unit in Fig. 5 is designed especially for use on high speed cargo vessels used in military service. Oversize connections are provided at both ends of the drain pan in order to insure proper drainage even though the ship may have a pronounced list. Ceiling type water defrost units are also used on shipboard to refrigerate smaller spaces such as ship stores.

Ceiling type blower units can be arranged to provide proper air distribution without the need of ducts. They are more economical than floor units and they do not occupy valuable floor space. They are available in various sizes for direct expansion or flooded operation. A typical commercial installation is shown in Fig. 6 where four water defrost ceiling type blower units are installed in a frozen food storage room. A low rate of moisture removal is evidenced by the slow accumulation of frost on these units. They are defrosted only twice each week but it was found that the more frequent defrosting gave better results. Piping is arranged so that two units are defrosted at a time.

The water defrost coils shown in Fig. 7 are installed in a room 208 feet long and 98 feet wide. The room is held at minus 5F. and air throw from the units carries across the width of the room without a noticeable difference in temperature between one side and the other. While originally intended for storage this room is frequently used for freezing quantities of products. Piping is arranged to defrost four units at one time and defrosting is performed manually once each 24 hours. In this installation it was found possible to operate for several days without defrosting but the 24-hour schedule has been found more desirable.

In some installations units may be arranged more conveniently around a column than along a wall. Such an installation is shown in Fig. 8. This happens to be an apple storage room maintained at 31 F.

The Alford Refrigerated Warehouse in Dallas, Texas, noted for its immense size and unique construction is refrigerated by ceiling type water defrost units. These units are arranged in groups, some of six and some of twelve, around supporting columns as shown in Fig. 9. This photograph was taken during a smoke bomb test to study air distribution. This installation was originally defrosted from a portable tank truck equipped with a pump. Flexible connections were located on the columns together with electrical connections for the pump. Although this system operated successfully for a considerable period of time, it was later replaced by permanent piping in order to reduce labor costs.

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**Next Month**

**What Makes An Operating Engineer**

**By Prof. H. G. Venemann**

# News Notes and Chapter Activities

NAPRE Department

## Los Angeles

FRED HERR

A TALK on fundamental automatic-controls by Richard Beaubien, sales engineer, Minneapolis-Honeywell Regulator Company's Southern California office, highlighted the educational session of California Chapter No. 2's March 4 meeting. The lecture dealt with automatic and manual controls, and was illustrated with slides. At the conclusion of his commentary, Mr. Beaubien gave a demonstration of the operation of various types of valves and controls.

The first March meeting attracted an exceptional attendance of members and guests. Introduced personally by President Frank G. Muzzy were three members from Bakersfield, Calif., employees of the Bakersfield Ice Company: Charles Emerson, James E. Eckert and D. Leon Stanfield. Muzzy lauded them for their regular attendance since joining a short time ago. He pointed out that the three young men have made a 225 mile round trip from Bakersfield to Los Angeles to attend the last three meetings in the Terminal Club.

Three applications for membership were approved and the following were added to the active rolls: John A. Whipple, engineer, Golden State Co., Ltd., Los Angeles; Charles L. Eshelman, chief engineer, Commercial Packing Company, Vernon; Clayton Lyle, Maier Brewing Company, Los Angeles.

W. R. Burnett, membership chairman, gave the results of the campaign thus far. The total, as of March 4, he reported, was 19 new members. The California Consumers-Union Ice Company team accounted for 11 and the Independents 8. Donald Byl of the Union Ice Company, who has already signed up seven new members, was the recipient of a special prize donated by William Losch of the Frick Company, who had promised an award to the man first signing up five new members.

Mr. Burnett, striving with might and main to put Los Angeles Chapter back on the top in the 1953 drive, has devised a new idea for stimulating the signing of new members. He calls it the "Member a Year Club." Each member of this club will be privileged to wear a button designating him a member of the exclusive set. The badge is so designed that the number of new members brought in can be shown on a removable slip.

He is shooting high in the 1953 campaign, it may be noted from his remarks: "The first 200 will be considered charter members," he said. "In the past only a few have participated actively in the membership drive, but this new method gives everyone who participates recognition. NAPRE needs more active membership representation from all phases of Southern California industry. It is your organization and represents the refrigeration industry." Burnett also implied that those belonging to the Member A Year Club will have "special privileges" and can expect "favors" at the Old Timers Night in June and Hams-and Beans Night in September.

As of March 4, the new club had ten members—Donald Byl, seven, Frank Muzzy, two, and one each brought in by Fred Nevins, George Paulick, William Losch, Joe Eckert, M. L. Hughes, Rudi Kettler, Michael Ulius, and M. L. Long.

The financial report was presented by Herbert N. Royden in behalf of William Losch, committee chairman. The report revealed the chapter to be in healthy financial condition. The preliminary class, conducted by Guy King, studied Chapter No. 10, Lubrication, in King's book, Basic Refrigeration.

The business session of the February 18 meeting was called to order by President Frank Muzzy. Applications were received from Leon Stanifeld, John W. Motz, J. A. Camache, F. C. Lezotte and, for reinstatement, from Lyle Thomas. The applicants were unanimously approved on motion by Rudi Kettler and Regis Gubser.

In reporting for the educational committee, Gubser read the proposed schedule of speakers for the year, most of the topics of which have already been approved. E. T. Quinn of the Pacific Fruit Express, was named by President Muzzy to serve as the chapter's representative on the general committee of the Southern California refrigeration industry which is sponsoring the construction of a memorial library and refrigeration laboratory in honor of the late Jesse Blair.

The scheduled speaker, John F. Daly, Manager of Ice Plants for the Santa Fe Railway Company, was unable to attend, due to an unexpected eastern trip. Mr. Daly's Dallas convention paper on "Evaporator Design" was read by Regis Gubser, with T. R. Barben of the Santa Fe, and Ralph Moore of California Consumers Corporation collaborating in the slide projection and question-and-answer period. (Mr. Daley's paper was published in detail in the March issue of ICE AND REFRIGERATION.)

## Memphis

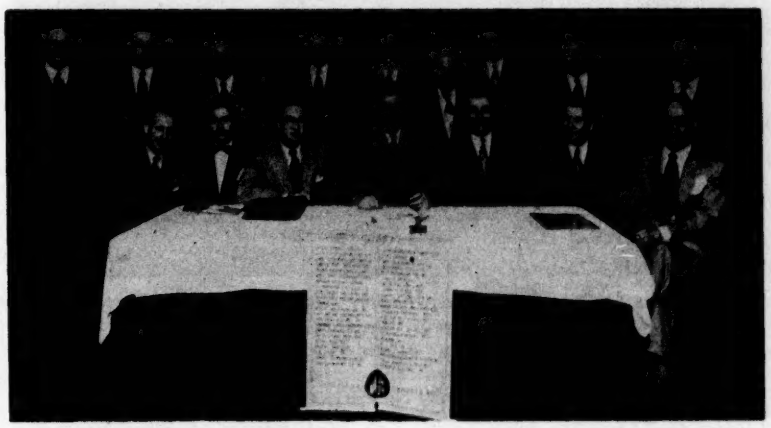
CHAS. A. CONLEY

BUSINESS discussions were light and operation of refrigeration equipment talk was heavy at both regular meetings of Tennessee Chapter No. 1, Memphis, on Wednesday, February 4 and February 18. H. L. Todd, chapter instructor, lectured on pages 209 through 222 from section No. 7 of the Guy King Course on refrigeration. Since the subject was operation of refrigeration equipment, the instructor spread it over two meetings, going into great detail on the operation of plant and equipment. His talks were augmented by blackboard illustrations. The meetings were exceptionally well attended and more than a few of the members actively participated in the discussion.

March, the windy month of the year, it was hoped would blow in many new members for Tennessee Chapter No. 1 and all of the unpaid dues. The instructor at our first meeting in March continued the discussion on operating, general maintenance and servicing of refrigeration equipment, covering pages 223 through 232. Claude F. Pace, assistant engineer for Swifts Ice Cream Company, was elected to membership.

Two near tragedies overtook a couple of our members here recently, and we are very happy to report that both are progressing satisfactorily. Harry W. Walling underwent an appendectomy on February 24, and although the appendix had ruptured, he seems to be snapping out of it very well. Our member, F. B. Howell was involved in a very bad auto-railroad train collision. Although he is coming along very well, his wife suffered more serious injuries and another woman passenger was killed.

## Louisiana Chapter No. 2 Elects New Officers



*New officers of Louisiana Chapter No. 2, New Orleans: Seated: D. Fischer, M. Mancuso, Leo Vivien, J. Chaisson, F. Chase, E. Orth, G. Whitman. Standing: E. K. Strahan, Sr., M. Olivier, F. Gillio, V. Foret, G. Fairchild, B. J. Mancuso, A. Wegener, M. Sofer, J. Vernaci. These officers were installed at the regular meeting on January 14, 1953.*

## St. Louis

K. N. HOLLADAY

REGULAR meetings of the St. Louis Chapter have continued with discussion on the Guy King refrigeration course. Waiving a lengthy report on our activities, we would like to do a little bragging about our president and educational instructor.

John T. Dabbs, our very energetic instructor, is the sales engineer and construction supervisor for the York Corporation, St. Louis. In addition to being a member of NAPRE, John is a member of ASH&VE and a registered professional engineer. He

*Chas. J. Wunderlich*

*John T. Dabbs*

Charles J. Wunderlich, sales engineer for B. H. Spangler Company, St. Louis, is our president. Charlie got into the refrigeration game in 1930 with the Brass and Copper Sales Company. He has been with his present firm since 1946. He has also been a member of NAPRE since that same year and is a member of RSES and ASRE.

is a graduate in mechanical engineering of Mississippi State College 1934. His operating career started in ships of the U. S. Merchant Marine. With the exception of one year when he was affiliated with the Highland Technical School in Hollywood and a six-year tour of duty with Uncle Sam during the past war, he has been employed by the York Corp., in Seattle and St. Louis since 1936.

## San Francisco

LEWIS BROOKS

ON WEDNESDAY March 11, San Francisco Chapter adjourned their regular meeting and members were taken on a conducted tour of the Western Regional Research Laboratories at Albany, California. This Laboratory, operated by the U. S. Department of Agriculture, has the latest and advanced mechanical refrigeration equipment and cold storage rooms for conducting experiments in food commodities. This chapter is indebted to W. B. VanArsdel, associate director, for his invitation to tour the lab. and to Ed Lowe and O. H. Spaugh who conducted the tour.

*New officers for the California Chapter No. 1 elected and installed at their first meeting of the new year. Back row: Frank Cordoza, 1st vice-president, chief engineer for Golden State Co., Ltd., Northern California; Fred Imsand, sgt.-at-arms, 1st assistant engineer, Spreckles-Russell Dairy Company, San Francisco; Charles Stewart, treasurer, an operating engineer, Guerrero plant, Golden State Co., San Francisco. Front row, H. E. Boudreau, 2nd vice-president, design engineer, Cyclops Iron Works, San Francisco; Lewis Brooks, secretary, sales engineer, Carrier Corp., San Francisco; President Herschel O. May, president, Industrial Installations, Inc.; and Marshall T. J. Garlinger, assistant design and technical engineer, M.S.T.S.-Pacific, U.S.N., Installing Officer.*

## Colton

HARRY BONTER

THE February 11 meeting of California Chapter No. 5 was held in the Sante Fe Ice plant lunch room in San Bernardino. Numerous members were reported ill that evening including the educational instructor, F. J. Scherer. Business in the meeting was taken care of in short order with president T. C. Bangs presiding. Mr. Bangs introduced the speakers from Los Angeles. They were Frank G. Muzzy and Bill Maulc of the Skasol Products Co. Mr. Muzzy is also president of the California Chapter No. 2 Los Angeles.

These gentlemen implimented their talk with a very interesting colored picture of industrial plants and oil refineries, the motion picture itself showing considerable scenery in and about Arizona and California. Boilers and condensers, and the de-scaling of these heat exchangers were the primary topics of the talk. The motion picture itself helped put across the de-scaling process when it showed how hard scale dissolves when treated with Skasol solution. After the discussion, members enjoyed the usual lunch. Oh yes, the secretary won the attendance award.

## Minnesota

HERBERT M. DUPAUL

THE regular meeting of Minnesota Chapter No. 1 was held on February 10, 1953, in the shop of Gartner Refrigerating and Manufacturing Company of Minneapolis. President George T. Gartner presided. Quite a few members and guests made the meeting in spite of the heavy snowfall.

A request from Al Thor to withdraw his membership because of inactivity in the field of refrigeration was approved. A letter from the national secretary was read in response to request for printing prices. It was decided to have the printing done locally. Quite a few members ordered lapel buttons. The treasurer made his annual report and the Minnesota Chapter appears to be in sound financial condition.

Following the business meeting, president Gartner described the functions and operations of various makes of refrigeration gas purgers. He illustrated his remarks by many good drawings on the blackboard. Rex, Armstrong and Frick purgers were described in detail.

## Tulsa

JAMES W. PARK

OFFICERS for the Tulsa Chapter elected in January are Gene Sumner, president; Bob Palmer, 1st vice-president; Paul Walter, 2nd vice-president; James W. Park, secretary-treasurer; George Hughes, sgt.-at-arms and George Koehne, director, who is a past president of the National Association. The treasury was also proud to forward its contribution collected in the past few months to the Emerson Brandt Memorial Trophy fund. Our congratulations to New Orleans on winning this trophy in its first year. We'll be in there competing for it this year with all the rest.

## Dallas

CECIL E. TAYLOR

REGULAR meeting of the Dallas Chapter was held on February 2, in the auditorium of Alford's Warehouses. Following the business meeting, a member of this chapter and a national director of NAPRE, Elliott R. Hallowell, gave a lecture on selecting an adequate air conditioning system. His talk was along the same line and re-emphasized the points he brought forth in his paper delivered to the National Convention here last November. More time was available for discussion and explanation than had been allotted at the national convention. Therefore the members felt that they got more out of the talk on this occasion. Mr. Hallowell also explained the balanced air conditioning system, and the use and operation of face and by pass dampers (see Choosing an Adequate Air Conditioning System in February 1953 ICE AND REFRIGERATION, *page* 42).

The second meeting of the Dallas Chapter in February was reported by Harold Koutnik. At that meeting Obert K. Irvine, chief engineer of Southland Corp., a member of Dallas Chapter, conducted a discussion on servicing Freon equipment and superheating of ammonia. At this same meeting E. C. Rees, one of our newer members, a field engineer for Wright Chemical Corp., gave a talk on water treatment. He started with a general discussion of water and the minerals found therein. He discussed the composition of Dallas city water and its general characteristics. From these he proceeded in his discussion to cooling water systems and the problems which occur as a result of scaling, corrosion and biological fouling.

He concluded his talk with comments on the methods of internal chemical treatment to combat and control problems that arise in cooling systems. The members noted that his talk was very similar to "Scale Control and Removal in Evaporative Condensers" by Dal Walser, Chicago district manager, published in the January issue of ICE AND REFRIGERATION. (See page 45).

Mr. Rees announced to his audience that reprints of the talk are available upon request to the Wright Chemical Company.

## Detroit

L. L. ADAMS

THE regular meeting of Michigan Chapter No. 1, Detroit, was held on Thursday, February 19, at Carl's Hall. Dinner was at 6:30 p.m. and the meeting started at 8:00. Following the usual order of business, the educational session was conducted by Leo C. Gage, a member. Mr. Gage is with the Bureau of Safety Engineering for the City of Detroit. His subject was condensers.

The members were grieved to learn that the chairman of the educational committee, Bob Doremus, lost his wife last month. Bob and his family journied East to lay her to rest and he has not been with us for the past couple of meetings. In addition to Bob, a daughter, two sons and three grandchildren survive the late Hazel Doremus.

## Chicago

DOUG BENTON

CHICAGO Chapter, NAPRE, honored Jay R. Watson for 30 years of active membership, February 17, 1953. It was our annual ladies' night, and the members and their wives packed Landa's dining room on West Lake Street, Chicago. It was an overflow crowd causing the management of the hall to set up extra tables.

*Mr. and Mrs. Jay R. Watson*

Bert C. McKenna, a national director and president of Chicago Chapter, presented Jay with an electric two-faced desk clock, ornamented with gold filled trim, hands and numerals. The national secretary, Dick Kelahan, read a testimonial from the national president, Alvis J. Clay, congratulating Jay on his longevity and devotion to the objectives of NAPRE. In response, Mr. Watson, secretary at Chicago for ten years, accredited the wives of the membership with the real sacrifices of time and companionship with their husbands for the cause of NAPRE.

Ladies in attendance were presented with corsages, courtesy of Chicago Chapter. Mrs. Hubie Rancor, wife of a Chicago member, and daughter, Eileen, entertained with accordion duets. Guests and members joined in community singing of nostalgic songs of Jay Watson's courting days.

Guests, friends of Jay, who were in attendance included Mr. and Mrs. Walter Seyforth, Mojonnier Bros. Co.; Mr. and Mrs. Herb Hess, Creamery Package Mfg. Co.; Mr. and Mrs. Branden and Mr. and Mrs. Parks of Mars, Inc., and Mr. and Mrs. C. V. Perna, Carrier Corp.

Professor H. G. Venemann and Mrs. Venemann journeyed to Chicago from Purdue and the Professor acted as Master of Ceremonies for the affair.

## Seattle

JAMES R. BENNETT

AT the regular meeting on February 12, Washington Chapter No. 1, Seattle, was favored with a visit by John Hawkins, past president of NAPRE and formerly an officer of both San Francisco and Los Angeles Chapters. Mr. Hawkins is with the Army Quartermaster Corps and was visiting in Seattle on offical business. At this same meeting two new members were initiated, Earl Hylton and M. Hollinbeck.

NAPRE Department

## Members-at-Large

LEO J. VIVIEN

ONE of our members-at-large, in good standing for quite a number of years, W. H. Burton, wrote the national office not long ago for assistance. His employers had asked him to call in a couple of recognized firms on tunnel freezing. Our national office provided names of members and advertisers. He wrote that he received the assistance requested and further stated that he felt the association had indeed been very helpful and that he felt it was particularly wonderful to be able to rely on an association such as ours for assistance from time to time.

Jorge Rascon, consulting engineer of Rio Blanco, Mexico, forwarded an application for Francisco Requena Mas, an engineer for Mandujano Y Mendoza, engineering firm of Mexico City. The membership committee approved Francisco Requena Mas' application and he was elected to membership last month.

L. L. Yates of Falfurrias, Texas, responded to the secretary's request for information to complete his record by stating his affiliation with La-Gloria Corp. in a natural gasoline and recycling plant. Mr. Yates' occupation as a machinist and engineer in this industry is unusual or unique to our membership.

In the past few months we have heard from quite a few members-at-large on foreign assignments. Filadelfo Tugade recently acknowledged receipt of several back issues of ICE AND REFRIGERATION, Refrigeration Theory and Applications by H. G. Venemann, which he had requested, and his current issues of the refrigeration course and the Operating Data book. Mr. Tugade lives in Santa Cruz in the Philippines.

R. A. Boell of Boell Ice Pty. Ltd., of Fitzroy, Australia, writes how pleased he is with the refrigeration course and requests another copy of section 1 and 2 since his was never received. Quite often foreign mail goes astray and hence our foreign members wait many months to receive their course. We have also heard from Messrs. F. E. Hansen and E. E. Ebeling of F. C. Lovelock Pty. Ltd., Sydney, Australia, a couple of very interested members of long standing.

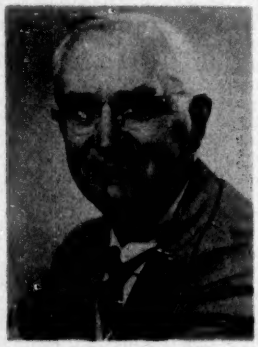
Wm. P. Sterling writes from Alaska that he is now the refrigeration superintendent for the Post Engineers at Fort Richardson. His plant is a 300 ton ammonia cold storage plant, and he has 1000 commercial condensing units and 2700 domestic refrigerators under his supervision on the Post. He relates that he could sure use another good operating engineer and several refrigeration service men for low pressure work.

A recent fire cost him most of his refrigeration books and he is attempting to replace most of them as best he can from limited funds. He says they are rather remote from the rest of the world and he is very glad to receive any hints or help that the members give through their reports to ICE AND REFRIGERATION and in the Operating Data book.

NAPRE Department

## NAPRE 1953 Convention To Honor Venemann

THE University of Purdue has been selected as the site of the 1953 Convention of NAPRE, it was announced by Alvis J. Clay, President, and Leroy Etzel, Chairman, Board of Directors. Choice of the convention spot is in accordance with the wishes of the delegates to last year's convention.



*H. G. Venemann*

The 1953 annual meeting will honor Professor H. G. Venemann, an honorary member now for seven years. For 30 years an NAPRE member, he starts his 12th year as Chairman of the National Educational Committee of the Association. Mr. Venemann is Professor of Refrigeration at Purdue University, from which he will retire at the end of the 1954 school term. Last December he was granted life membership in the American Society of Refrigerating Engineers.

Professor M. M. McClure, Assistant Director of the Adult Educational Division at Purdue and long time associate of Professor Venemann, will have charge of the general arrangements for the University.

## Garlinger Heads Port Engineers of San Francisco

LONG prominent in San Francisco Marine engineering activities, Marshall T. J. Garlinger, marine engineer with the Technical Section Maintenance and Repair Division, Military Sea Transportation Service, Pacific, has been elected president of the Society of Port Engineers of San Francisco for 1953. Mr. Garlinger has served as chairman of the Board of Governors for several years, and as chairman of the Program Committee of the Society for six years. He is a member of the National Association of Practical Refrigerating Engineers, and has served the latter organization in many capacities.

# N A P R E Question Box

**H. G. Venemann, Professor of Refrigeration, Purdue University and chairman of NAPRE Educational Committee, answers members operating problems monthly in this column. Send questions to Chairman H. G. Venemann c/o Purdue University, West Lafayette, Indiana.**

### $NH_3$ Emergency Disposal

**QUESTION No. 949: At the opening of the Korean conflict, our government set up a Civilian Defense Agency to augment the defensive forces, and to render services of aid and assistance to the civilian population should this nation be attacked. San Francisco Chapter, NAPRE, invited the CDA authorities in that city to address the Chapter and to advise how their group might assist in local civilian defense. One problem presented by the members in San Francisco, and which, to best of the writer's knowledge, has not been solved to date, is the disposal of tons of liquid NH3 in the event of a catastrophe. Actual experience of several San Francisco engineers in dumping even small quantities of NH3, in an emergency, in semi-residential areas, routed not only personnel in plants but also from apartment houses and residences. What are the experiences of other NAPRE members? Any recommendation?—B. C. McK.**

ANSWER: I had hoped to get suggestions from several sources as to how citizens could be protected from the effects of ammonia gas fumes in the event of an attack by aerial bombs. Up to date, Regis Gubser of Los Angeles, our 2nd Vice-president, and Mr. Edmund Rowland, Vice-president, Henry Bower Chemical Mfg. Co., are the only ones who have come to my aid. Here is what Regis has to say:

"I have rather fixed ideas about the dumping of large quantities of $NH_3$. They do not always coincide with the thoughts of the CDA and the local Fire Department (but in most cases these people do not understand the problem fully.)

"If the plant suffers a direct hit by either a regular or an atomic bomb, you have nothing to worry about. However, should a plant suffer only partial damage, the object is to conserve all the ammonia possible, because in case of an emergency ammonia will be necessary to preserve all possible food stuff.

"The same applies in the case of an uncontrolled fire moving toward a plant containing a large quantity of $NH_3$. In this case I would dump all ammonia in the low side then let nature take its course. If the fire gets to the plant it will consume the ammonia and the heat will take it away. On the other hand if the fire is controlled the $NH_3$ will be saved. In the event the $NH_3$ were discharged into the air while the firemen were trying to control the fire near the plant, the ammonia would drive them from the immediate area thus hampering their work.

"The substitute for the above procedure would be to have adequate connections and plenty of water available to dump the charge into the sanitary sewer."

Mr. Rowland answers as follows:

"It would be extremely hard to give detailed answers on how to dispose of large quantities of liquid anhydrous ammonia in residential areas. In general terms, it is known that gaseous ammonia is lighter than air, and when given the opportunity, will freely rise and dissipate. The other quality of ammonia, which might help, is the fact that it is highly soluble in water in either a liquid or gaseous state. If, therefore, the liquid ammonia could be directed into a large stream, this disposal would be greatly simplified.

"I fully appreciate this is not a complete answer, however, the problems that would be involved, in the event of enemy attack, not only with ammonia but with chlorine, propane, illuminating gas, gasoline and countless other materials, defies solution except on the most general terms."

I think that Regis has pointed out a very important point, viz: that of trying to keep the plant in operation and salvage as much as possible. I would like to stress the following points: First: Each city should observe the American Standard Safety Code for Mechanical Refrigeration when installing refrigeration plants. Many of its provisions are designed to protect the public from escaping fumes due to fire, lightning and shock. Second: The public should be taught simple remedies for the relief of persons overcome by ammonia fumes. Third: Supplies of ammonia held in drums could well be stored underground.

What to do in the case of bomb attacks would necessarily depend upon the extent of the damage. As Regis intimated, if the plant and the people are blown to bits there is nothing to worry about; but if only partial damage is sustained it behooves those surviving to save what they can. H.G.V.

### Insulation of Thermocouple Leads

**QUESTION No. 950: Is there any type of conductor available in which the insulation will not deteriorate**

**when subjected to condensation within the conduit? For example: Readings from Thermo-couples in cold storage rooms of my plant have gradually grown inaccurate. Investigation by manufacturer's representative indicates condensation in the conduit caused the insulation to break down resulting in improper readings. Renewing the leads with the same #24 guage twin conductors and sealing ends of the conduit with hydroseal is all the manufacturer had to offer.—C.J.F.**

ANSWER No. 1: One manufacturer of remote reading and recording instruments, utilizing thermocouples, has recently marketed what they call a copper constantan polyvinyl duplex conductor in the guage you desire. They describe it as condensate and water resistant. The manufacturer guarantees their product indefinitely; that is, its life expectancy is longer than normal building life. They limit their guarantee according to the application. Below minus 30 F the guarantee will be effective only to an application where there is no flexing of the cable or conduit. In other words, below minus 30 F the insulation will probably be brittle and flexing therefore will crack it.—JRK.

ANSWER No. 2: Duplex wires with either rubber or polyvinyl plastic insulation on each wire will offer the greatest resistance to deterioration. These water proof insulations should not be the "push back" or strippable type. Cotton wrapped wires with rubber weather proof braids must be sealed at the ends.—W. L. Sibbet.

### Power Requirements, Various Refrigerants

**QUESTION No. 951: Does it take more power to compress one refrigerant than another?—L.J.V.**

ANSWER: With the exception of $CO_2$ all of the commonly used refrigerants when operating at "standard-ton" conditions of 5 F evaporating temperature and 86F condensing temperature require about the same theoretical hosepower per ton. This is shown in the table on page 224 of *Refrigeration Theory and Applications*, with the following results: Ammonia, 0.99; methyl chloride, 0.964; Freon 12, 0.997; carbon dioxide, 1.976. Other refrigerants require the following theoretical horse power per ton: Freon 11, 0.94; Freon 22, 1.02; Freon 113, 0.98; Propane, 1.02; Sulphur Dioxide, 0.96. Numerous tables have been printed in text books and in magazines comparing the horse power requirements of the refrigerants. Most of them will agree quite closely with the above results.—H. G. Venemann.

## New Questions

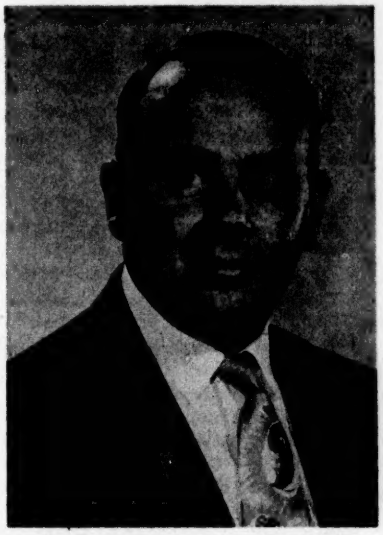
**QUESTION No. 952: What would be the results if I mixed a small amount of F-22 in a system charged with F-12?—A.J.C.**

**QUESTION No. 953: Does it pay to subcool the liquid refrigerant before it enters the expansion valve?—L.J.V.**

**QUESTION No. 954: Where flourine is added to a water supply for dental protection, does it reduce its quality in Cooling Tower, Evaporative Condensers or Roof Pond operation?—A.J.C.**

## Know Your Officers

DELEGATES to the 1952 Convention of NAPRE at Dallas, elected Leroy Etzel, a director, to chairman of the board at that meeting. Leroy is superintendent of refrigeration for the Pacific Fruit Express Company, a joint subsidiary of the Union Pacific and Southern Pacific Railroads. He started with his firm in 1920 at Roseville, Calif plant and later moved to Omaha, Nebr., back to Pocatello, Idaho and then to Roseville, as chief engineer. Following World War II, Mr. Etzel was moved into the position of refrigeration superintendent and



*Bert C. McKenna, Chicago, Ill.*

makes his offices in the Rialto Building headquarters of his firm at San Francisco. Our chairman of the board has been a member of NAPRE since 1921 and a member of ASRE since 1946. A past-president of Sacramento Chapter, he has also held offices in California Chapter No. 1. He makes his home in Oakland, Calif.

Another board member of several years standing, who was re-elected at the convention last year, is Bert C. McKenna. Bert served his apprenticeship under M. E. Bell, a NAPRE member who is now chief engineer and master mechanic for Sicks Breweries, Seattle. Bert has gained his refrigeration experience and knowledge in packing houses, breweries and creamery plants in Utah and California. He has been a chief engineer or a supervising engineer for the past 16 years. At present this member is chief engineer for Central Cold Storage Company in Chicago and has responsibility for their five plants in that area. Previously he was chief engineer for the Guerrero Street plant and sub-plants in the San Francisco Bay area for Golden State Co.

Bert is a member of the joint ASRE and American Meat Institute Refrigeration Committee. When asked how he started his climb in the refrigeration operating field, he told how member Bell encouraged him to take in meetings of NAPRE in San Francisco and attend a technical school. Under this guidance he completed a course of mechanical engineering subjects, including metallurgy and welding. Although this has helped him greatly, Bert is inclined to give most of the credit to NAPRE and the engineers connected with it, who give freely of their experience and knowledge for the benefit of younger engineers in the field.

## Canadian National Builds New Refrigerator Car

AN EXPERIMENTAL refrigerator car, designed by Canadian National Railways research engineers to incorporate and test so many new features that it is virtually a laboratory on wheels, is now being built for the railway by the Marine Industries, Limited, Sorel, Quebec, S. W. Fairweather, vice-president of research and development for the rail, announced.

Expected to be ready for extensive road tests next April, the new car features an underframe that, with the exception of drawbar mechanisms and safety devices is made entirely of aluminum; and a double purpose superstructure which will provide cold-wall refrigeration and help maintain uniform temperatures in all parts of the car.

## Beef for Export to Greece

THE U. S. Department of Agriculture has offered to buy a quantity of frozen beef for export to Greece under a Mutual Security Administration requisition. The USDA said this offer to buy beef may help to strengthen the cattle market. The frozen beef must be in carcass form cut into quarters and wrapped for export. Offers are invited for both U. S. Commercial and U. S. Utility grade carcasses in the 400 to 700-pound range.

FrozenFoods
*Reg. U. S. Pat. Off.
PREPARATION PACKAGING FREEZING STORAGE DISTRIBUTION DESIGN CONSTRUCTION EQUIPMENT

# Frozen Foods Industry Surveys Problems At Annual Convention

THE annual national frozen foods convention was held at the Conrad Hilton Hotel, Chicago, the week of March 2. Sponsored by the National Association of Frozen Foods Packers, the following organizations participated: National Wholesale Frozen Foods Distributors Association; National Food Brokers Association; National Association of Refrigerated Warehouses.

All important phases of frozen food industry operations were included in subjects of panel meetings and addresses. The program, arranged by the National Association of Frozen Food Packers, included a variety of subjects which are creating lively discussion in industry circles. Among these were: trends in frozen food packaging, current problems in the cold packing industry, grading the tenderness and maturity of frozen lima beans, frozen food transportation clinic, rates costs and equipment, cost factors in frozen food production. An added feature was a special address at the packer's membership luncheon by Edwin L. Morris, who spoke on meeting the distribution challenge of frozen foods.

## Panel Discussions

Panel discussions were led by outstanding industry authorities and full audience participation was encouraged. Of special interest to refrigerated warehousemen was a luncheon Wednesday, followed by a panel discussion of mutual problems of the warehousing and frozen food industries.

At a luncheon on Tuesday, the Association of Frozen Food Packers presented an honorary life membership in the association to T. E. Gibson of New York City, formerly of Birds Eye for his efforts and energy in helping in the formation of the association. Mr. Gibson is on government assignment for the Mutual Security Agency and a plaque symbolic of the life membership was accepted on his behalf by G. O. Bailey.

### National Association Frozen Food Packers 1953 Officers

**President, M. K. Spiegel, Salinas, Calif.**

**Vice-president, John Baxter, Brunswick, Me.**

**Vice-president, G. C. Bailey, New York City.**

**Secretary-manager, L. S. Martin, Washington, D. C.**

**Assistant secretary, Keith O. Burr, Washington, D. C.**

**Board of Directors: William Volkmann, Sturgeon Bay, Wisc.; Francis Wilcox, Ontario, Calif.; Sterling Doughty Jr., Sacramento, Calif.; T. V. Delson, New York City; F. G. Lamb, Portland, Ore.; E. J. Watson, Mount Vernon, Wash.**

### National Association Frozen Food Distributors 1953 Officers

**President, Joseph Gaudio, Camden, N. J.**

**Regional vice-presidents: George McRoberts, Jersey City, N. J., Eastern; John Balderacchi, Greensboro, N. C., Southern; John Godfrey, Milwaukee, Wisc., Central; Paul Clampi, San Rafael, Calif., Pacific; Frank Hicks, Houston, Tex., Southwest.**

**Treasurer, Howard Jester, Bloomington, Del.**

**Secretary, Carlton Eacho, Washington, D. C.**

**Chairman Board of Directors, W. L. Pavlovski, Chicago, Ill.**

## Concentrate Production

According to John M. Fox, president of Minute Maid Corp., the current outlook indicates that frozen juice concentrates will continue the favorable growth trend that has made them one of the most spectacular food items ever seen. Although accurate statistics are difficult to obtain in a new industry such as this, it is safe to assume that the consumers of frozen orange concentrate have increased their average weekly purchases by at least 30 percent over a year ago. Continued heavy advertising and promotion, coupled with lower retail prices to the extent of between one and two cents per can have undoubtedly brought about this increased utilization.

In spite of this optimistic outlook, there are some real danger signals

## Research Program For Frozen Foods

A FIVE year, $200,000 nutrition research program was announced by directors of the National Association of Frozen Food Packers at the National Frozen Foods convention held at Chicago the week of March 2.

Harold J. Humphrey, research manager of the Birds Eye division of General Foods corporation and head of the association's nutrition administration committee, said the program will be started through grants in aid to universities well recognized in the field of nutrition.

In the first phase of the program approximately 35,000 regular production packages, including 45 frozen fruits, juices, and vegetables, will be selected and tested in a representative sampling in all regions of the country during 1953 and 1954. Each lot of samples will be tested for 21 nutritive qualities.

From 1954 through 1957 the second phase of the program will be undertaken, including studies on storage, commercial distribution, processing, cooking techniques for consumer and institutional size packages, and related phases.

Negotiations are now under way to start the program under the direction of the Wisconsin Alumni Research Foundation, located at the University of Wisconsin.

A series of published reports will show the range and average of nutritive values of frozen foods.

flying for the industry: There was a substantial inventory carry-over from last season, and processors are currently running about 7 million gallons ahead of the production schedule of last year. A total pack of 50 million gallons for 1953 is a real probability as compared to 43 million last season. The orange crop indicates a considerable increase next year thereby adding risk to large inventory carry-over. Fruit costs have gone up, adding to production costs.

### Trends in Packaging

The trend in frozen fruits is to tins and smaller sizes while vegetables will continue to be processed in fibre cartons, is the opinion of experts who spoke in a panel discussion on "Trends in Frozen Food Packaging." Other conclusions were: Fibre containers will continue to be used for vegetables because of the higher cost of tins for vegetable packs; the cartons weigh less and can be stored more easily with less of a space demand.

There seemed to be no ready answers for a number of problems that were posed such as labelling, whether horizontal or vertical, and paper labels vs. lithographing. The panel agreed that both methods had their place in the packaging picture.

The trend to smaller sizes was discussed informally by the panel and it was explained that the industry is going to the 10 ounce size in vegetables with the exception of the leaf vegetables, such as spinach. Motivating factor in this development is that the 10 or 10½ ounce package contains a serving for three to four persons, which meets the requirements of the average American family and at the same time is more attractive pricewise.

No happy medium was reached on the question of bundling, with a variation of practices reported and the panel could not see in the too near future the possibility of a standardization of sizes.

On the question of the possibility of new types of containers, it was agreed by the panel that no revolutionary changes are in prospect.

### Warehouse Costs

Order assembly and warehousing costs of moderate size distributors was discussed by E. P. Gough, Roanoke Frosted Foods. These costs, he said, are indeed vital problems which frozen food distributors must be able to control in order to make the profits they so justly deserve. There are no other wholesale distributors of any type who are confronted with the intricate problems that are inherent to the wholesale of frozen foods. The fact that the products are frozen and must remain so, during the channels of distribution, is the primary problem of all distributors whether they realize it or not. How we tackle that problem and how we solve it can mean a great difference in our net profits.

The first cost for distributors to consider is the one involving a breakup and storage room. This is primarily a fixed expense and one which costs a lot of money. Mr. Gough said they operated their business out of a commercial warehouse for five years. A little over a year ago they built their own freezer in an already existing building. They did this primarily to reduce storage costs, to obtain better office facilities, and to be able to come and go as their business required.

### Control of Operation

There are other advantages of doing business in ones own building besides the lower cost. They find that they can control their operation more efficiently and that their employees' work output is greater. Their experience with the storage problem may be in conflict with some other distributors, he said. All cases should be considered on their own merit. Should any distributor be planning to construct a frozen food storage space he can save future expenses by careful planning of the plant layout.

The second cost, and the one which is of great concern to most distributors is that of order assembly. After experimenting with a number of methods they found the one-man push cart operation to be the most successful. To obtain maximum benefit from this method of order assembly they constructed in their freezer a set of wooden bins each designed to hold about 20 cases of frozen foods.

The products are stored in the bins in the exact sequence in which they appear on the invoice. The man filling the order takes a cart and goes down the aisle assembling the order as he goes, very similar to the manner in which a customer shops in a supermarket. This method can have two, three or four men with carts, each working a separate order at the same time. Based on 100 frozen food orders, the production rate is 3.7 man minutes per order.

After the order has been filled it is placed on a skid located in the order holding area. The accumulated orders remain there until ready for loading or delivery trucks. A hand operated hydraulic platform truck is used to transfer the skids of orders to the loading platform. There they are checked and loaded in reverse order.

## Frozen Foods

The third cost is the expense involved in receiving merchandise, unloading and stacking it. Much of their merchandise is received in direct shipments from the packer, but most of the retail fruits, vegetables and juices are withdrawn from spot stocks at a commercial warehouse. A round trip of four miles is involved. They schedule withdrawals on days that they are least busy in assembling orders. By maintaining records of sales on all items they are able to keep stocks in their freezer at a workable minimum at all times. Cartage is indeed an expense but they can control receipts which they could not do on direct shipments. The merchandise is unloaded at the platform on skids which in turn are hauled into the freezer with the platform truck. The product is at once placed in the bins.

Their operation has its shortcomings such as: (1) incorrect platform height, (2) need for power operated handling equipment, (3) need of more freezer space, (4) cartage expense. They hope to solve these problems in the future and by doing so will be able to cut their costs of operation a little more.

### Transportation Clinic

Railroad and truck carriers have done an excellent job in providing equipment to transport frozen foods and new equipment is in the experimental and manufacturing stage, a panel on frozen food transportation told the convention.

Ray Harron of General Foods Corporation, chairman of the Association transportation rates committee and B. M. Angell of Stokely Foods, Inc., chairman of the transportation and equipment committee, led the panel which was featured by discussion from the floor.

Angell said that a recent meeting with the carriers revealed that mechanical type cars will be added in 1953 to supplement the cars now in use.

Harron expressed the view that the industry is attempting to obtain transportation rates equal to those charged the canned goods industry. He pointed out that although frozen foods require special refrigeration, the carrying of frozen foods is easier than canned goods because of less space required in loading.

The industry was commended for its low damage claim record and it was pointed out that the frozen food industry has one of the lowest claim records in the nation. A hope was expressed that compartmentized cars will be developed in the near future.

Railroad and truck carriers at the meeting indicated that more mechanically refrigerated cars will be produced in the next few years and problems of servicing and maintaining zero temperatures are being worked out.

The association, which has already published a directory of railroad cars suitable for the transportation of frozen foods, will within the next 90 days publish a similar list of trucking lines with suitable equipment.

## Distribution

A study of the frozen foods business showing that its Number One challenge is distribution which must be met by gearing its distributing organization to the requirements of serving an increasing share of the mass market rather than by methods of expediency was reported on.

Edwin L. Morris, partner in the management consultant firm of Booz, Allen and Hamilton, presented the analysis, entitled "Meeting the Distribution Challenge of Frozen Foods", at a luncheon and annual meeting of the National Association of Frozen Food Packers.

Four major elements of the distribution problem were outlined by Mr. Morrie as follows:

1—The frozen food industry should anticipate continuing pressure to reduce retail prices of the packaged products.

2—The lower retail prices will continue to demand reduction in distribution costs if packers and distributors are to enjoy a reasonable profit return.

The move to sell direct to chains and cooperative groups has weakened a distributing organization which already lacked maturity and strength.

Significant reduction in distribution costs cannot be accomplished until successful operating patterns for frozen foods distributorships are developed.

Because of differences in interests, Mr. Morris pointed out in discussing what should be done about the problem, it is not possible to give a simple blueprint of what each concern should do. But he offered five recommendations to those packers pushing sales of their own branded production, as follows:

1—Cultivate consumer brand acceptance.

2—Provide merchandising pressure at the point of sale.

3—Have distributors perform essential financial and mechanical functions.

4—Recognize your responsibility for helping distributors operate profitably.

5—Reduce the number of steps from the packing plant to the distributors' warehouse.

In reviewing these points Mr. Morris said: "Your immediate, pressing distribution problems today require that you treat individual markets in varying ways. But if you become so preoccupied in expedient adjustments here, there and in the next market that you don't accomplish the basic distributor building job, in my opinion, you will not be meeting the distribution challenge of your industry."

According to Morris, the frozen food distribution problems are very complex and conditions differ widely in various sections and markets, thus making it difficult to generalize. He found a good deal of confusion which he said was to be expected because of the speed of changes in the industry. He also noted a wide difference of opinions as to the actual problems.

The report traced sales increase in the industry showing that from 1945 to 1952 the per capita production of frozen foods climbed 98 percent while fresh products dropped 20 percent in the same period. As a result, frozen products have progressed almost overnight from the category of specialty items to staple items. From a volume level of only four hundred million pounds in 1940 they advanced to over three billion pounds last year. The share of the consumer's dollar in food stores has increased 36 percent in 1949, 38 percent in 1950 and in 1952 it is reported that the increase was even more than 40 percent.

In discussing the decline in prices of frozen foods at the retail level, he pointed out that this price decline has played an important part in increasing sales volume, and has put the squeeze on profits. For short periods in the future there may be some strengthening of some frozen food prices, depending largely on the supply situation. The pressure for lower prices at the retail level can be expected to increase rather than to lessen. Although packers and their distributing organizations think the price situation is tough today, he believes that for most items no one should look forward to sustained relief. The packers should be prepared for continued pressure on prices.

## Consistent Expansion

According to Clarence Birdseye, frozen foods consultant, frozen foods have brought a new way of life into American homes and have revolutionized many diverse types of food production. The fishing industry of New England would go stone-broke overnight if its freezing plants were closed down—and so would the citrus growers of Florida, the poultry areas of tri-State Del-Mar-Va, the strawberry growers of Louisiana, the fruit people of the West and many other food-producing areas. In fact, frozen foods have become just about as essential as telephones.

Americans are now spending 65 to 70 billion dollars annually on food; and at least 60 percent of that food is so perishable that it must be artificially preserved by either heat or cold. Thus the quick-freezing industry even now has a conceivable potential of some $40 billion. What's more, our population will probably double in the next 50 to 75 years.

Quick-freezing will therefore continue to expand enormously for many years to come. Only one thing can stop it, the possible development of a better and cheaper method of preservation, and no such improvement has as yet appeared above the commercial horizon.

## Temperature Control

George L. Mentley, sales distribution manager Birds Eye Division, General Foods, talking on uniform temperature control, said that in any discussion of the development of the industry, it must be recognized that frozen foods are not better than the original raw material that comes from the fields or the sea. Each individual product purchased in the grocery store can be just as good as the hour it was packed provided it is not permitted to lose its quality before going on the range or table.

In the early years of the frozen foods industry the danger of lowering the quality of the quality-packed item through defrosting, and perhaps subsequent refrosting, somewhere between processor and consumer was a serious threat to the development of sales.

Through the combined efforts of every segment of the industry, from farmer to retailer, this threat has been greatly diminished. Constantly we are on our guard against a return to the early days and early threats to the success of our business. We are steadily marching toward our goal—the consistent keeping of frozen foods at or below 0 F en route to the home.

Only when frozen foods are consistently kept below 0 F on their way to the kitchen can we be sure their quality will be unimpaired.

Packers, distributors, carriers, warehousemen and retailers are all making great progress in maintaining sub-zero temperatures. One hundred percent sub-zero temperatures everywhere, at all times, is the goal. We are close to it. To hold our ground and close any gap that may remain is a constant objective of his own company and of the National Association of Frozen Food Packers.

# WHICH DO YOU NEED?

## INDICATORS—

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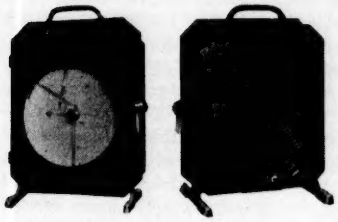
For **cold storage rooms, bunker rooms, brine tanks** and other applications where periodic reference is required and a continuous record is not considered essential.

## RECORDERS—



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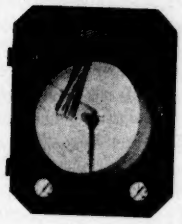
For **storage rooms, processing rooms, refrigerating rooms,** etc. A self-contained Taylor Recording Thermometer to check air temperatures in various rooms.

## CONTROLLERS—



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All of these people have a direct interest in the industry's continued growth. Neither the individual packer nor the National Association of Frozen Food Packers can do the whole job, for the packer has no control over the product after it passes to the distributor. The job can only be done if everyone from packer to retailer continues to do his part—and do it better and better—to make sure that frozen foods are properly handled while they are in his hands.

### Production Gains Slow Down

Speaking on 1952 production gains, C. L. Snavely, retiring president of National Association of Frozen Food Packers said that estimated production of frozen fruits, vegetables and concentrates in 1952 again shows increases over the preceding year. It is interesting to note, however, that the rate of change shows a decrease below the average annual rate of change based on 1942 and 1952 production of fruits and vegetables and 1948-49 and 1951-52 production of concentrates.

Production of frozen fruits has grown from 194.6 million pounds in 1942 to 415.9 million pounds in 1951 and an estimated 435 million pounds in 1952. This represents an average annual increase of 8.4 percent for the ten years but only 4.6 percent for the past year.

Production of frozen vegetables has grown from 152.5 million pounds in 1942 to 770 million pounds in 1951 and an estimated production of 800 million pounds in 1952. This represents an average annual rate of increase of 18.3 percent for the ten years, but only 3.9 percent for the past year.

All are familiar with the phenomenal growth of concentrates but it is interesting to note a reduction in the rate. The production in the 1948-49 season of 12,424,000 gallons has increased to 41,313,000 gallons in the 1950-51 season and 59,294,000 gallons in the 1951-52 season. This represents an average annual rate of increase of 68.4 percent for the three years, but only 43.5 percent for the last year.

The fact that concentrates show the largest average annual rate of change and fruits the smallest, is understandable. Frozen fruits have been packed for many years, while concentrates are a recent development. Frozen vegetables are in a middle position from both a growth standpoint and the years they have been packed in appreciable volume. It is not unreasonable to assume that vegetables and concentrates will show a decreasing rate of growth in future years.

### Metal Containers

The frozen foods industry during the past two years, according to P. P. Wojtul, of Continental Can Co., has increased its use of metal containers by 750 percent. In 1952, the industry used almost 50,000,000 cans, compared with about 6,000,000 in 1951.

Major products that accounted for this vast increase were strawberries, peaches and berries, but several lesser-volume items like pineapple chunks, figs and rhubarb also increased the volume.

If this present swing to cans for fruits is extended to vegetables, then the future of this industry may be even more phenomenal than its past.

### Quality Control

C. Courtney Seabrook, vice-president of Seabrook Farms Co., talking on maintenance of standards, said that as the quick-frozen foods industry lays its plan for another record-breaking season, the importance of strict adherence to quality control standards remains the paramount consideration for a successful future.

It would be unfortunate if, in the indicated expansion of the industry through increased production of second-quality merchandise; there were not the same care exercised in maintaining the proper standards for B grade products that have engendered their widespread acceptance by a large segment of the public.

Quality control embraces many parts and begins with the basic commodity—the food item which is to be frozen. No tricks in the processing can improve the inherent quality of a package of spinach, a carton of peaches or a pliofilm bag of chicken a la king. If the quality were not there in the first place, gleaming metal and sparking water won't do a thing for it.

Quality control, therefore, must begin with the soil. More attention must be given to the agricultural aspects of the over-all production on problems. The breeding of the seed, the development of a breed of chicken and other such down-to-earth matters are the starting point for quality production.

Quality separation is a special function that applies when the produce reaches the plant for processing and freezing. Here there must be a continuing watchfulness in the segregation of the product into the recognized quality grades. The quality control technician cannot be a stony-hearted policeman running a speed trap. Though he is the final arbiter on all quality problems, he must render his decisions so that production will proceed smoothly and profitably.

All along the distribution line, from packer to consumer, there must be adequate safeguards for the protection of frozen foods so that no quality loss will occur.

Distributors have an equal obligation in keeping the product at proper temperatures. Break-up should be accomplished as expeditiously as possible. Refrigerated equipment should be used in making deliveries.

At the retail level, he said, the store manager must take every precaution required of the shipper and distributor and observe many others as well. Display cabinets must be kept at 0 F, free of frost and stock should be rotated every week. New orders should be placed in back-room freezer storage or in display cases immediately.

## Revised Standards for Canned and Frozen Carrots

REVISED standards for grades of canned and frozen diced carrots have been announced by the U. S. Dept. of Agriculture. The revised standards, effective March 28, 1953, will supersede those which are now in effect.

Changes have been made in the standards with respect to small units of irregular size and shape and in the restrictions on blemished and seriously blemished units. The color has been further defined and limitations placed on off-color units.

A method for determining the size of quartered carrots has been provided in the standards for canned carrots to aid in the interpretation of the standards under the factor of uniformity of size. Drained weight recommendations also have been provided for additional sizes of canned carrots.

The revised standards are the result of studies which have been made by the Department and recommendations received from industry to bring the standards in line with packing and marketing practices. Proposed revisions of the standards were announced by the Department on September 16 and October 24, 1952.

## Wrapper Will Show If Contents Thaw

A NEW frozen food wrapper has been devised which will indicate if the package has been thawed. The wrapper is made of a cellulose type material and has a chemical reaction with water which affects either the wrapper itself or the printing on it. Wrappers could be made so that the brand name would disappear if the contents thawed. Another possibility is to print the words "not thawed" on the wrapper so that the word "not" would disappear if thawing occurred.—Cold Facts.

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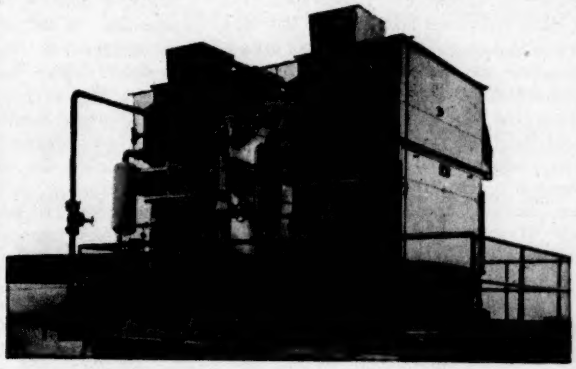

# Advantages of Air Cooled Condensers Over Wet Condensers

A THOROUGH and complete discussion of air cooled condensers, covering engineering, application, and installation was given by S. Charles Segal, general sales manager of the Kramer Trenton Company of Trenton, N. J., at the February meeting of the Chicago Section, American Society of Refrigerating Engineers. The advantages of an air cooled condenser over a wet condenser were illustrated.

Air cooled condensers have several points of superiority over wet condensers and would be in more common use today if the principles of design had been given more attention. Kramer-Trenton have been pioneering development in this field for 15 years and this is a bird's eye view of the wide range of data and material presented by Mr. Segal.

Unicon is the trade name for Kramer Trenton Company air cooled condensers. Although forced air is used for cooling, they are not noisy. They are not expensive to install since all rigging is eliminated and plumbing is not required. They are trouble free in operation since maintenance and service are not necessary except for periodical oiling and greasing of the motor and fan.

## Air Cooled Condensers Not Satisfactory

Conventional air cooled condensers have not been satisfactory for many reasons; mainly they have been in error due to the use of the wrong yardstick in measuring. They are chassis mounted and limited commercially to 3 hp since the condenser weight gets too large for chassis mounted designs over that size. Generally air distribution over the coils is poor, since the motor and fan are set to one side. The fan is an integral part of the compressor motor and the power required to move air amounts to about 20-25 percent of the motor horsepower. The fans are not designed for quiet air operation and their noise level is objectionable. Most chassis mounted units get dirty, the heat transfer rate goes down and the head pressure shoots up. The main reason for this is that the chassis mounted units are close to the floor and the fan continuously blows floor dirt across the coils.

There are no good reasons why air cannot be used as a condensing medium. There are many examples in common practice. The coils in a freezer are one example. Air condensing coils are in common use in buses, trains and window air conditioners. There are approximately a quarter million tons of air condensing units that have been sold.

There is no literature on straight air cooled condensers. They are presently designed for a 120F. condensing temperature and a 90F. air temperature. The success of Kramer Trenton has been due to the following changes. The condenser has been removed from the chassis. A separate motor is used to drive the fan. The design is made under good engineering principles. Good engineering designs can be employed for the best condensing temperature and air flow conditions on each job. The unit then becomes a remote type self contained air cooled condenser which has proved to be trouble free in operation.

## Noise Level a Problem

The noise level has always been a big problem. The noise level must be very low and Kramer Trenton have adapted two satisfactory designs. A direct motor to fan drive is used on condensers from ¾ to 10 hp. The fan operates at 1140 rpm and it makes no more noise than an ordinary refrigerator box unit. A belt drive is used above 10 hp and the fan speed is reduced from 550 to 325 rpm and this makes less noise than the average attic fan.

The Unicon air cooled condensers are selected on ratings and correction factors similar to evaporative condensers. The wet bulb temperature does not enter into or affect air cooled condenser design. The Unicon design is based on 110F condensing temperature and a 90F air temperature. The unit would be oversize if designed for higher temperature. It is true that temperatures may reach 95F or slightly higher but this temperature is not reached more than 2½ percent of the time. If temperatures of 95F or over are reached the condensing temperature increases to 115F. There have been no complaints due to poor performance. In fact they perform much better than water condensers in some cities. In Philadelphia, for example, every one is using water on a hot day and the water pressure drops to almost zero. It has even been necessary to install pumps in the water line to get water in Philadelphia during these low pressure days. The point is that water is in great demand during periods of high temperatures and low water pressures may seriously affect condensing temperatures. The Unicon is free of water demands.

The efficiency of the Unicon is seldom impaired. If mounted outside there is no need for cleaning. Sun protection on outside units is not necessary. If mounted inside, the units are raised 12 to 18 inches above the floor level so the fan does not pick up floor dirt. If for some reason the coils do get dirty, they can be easily cleaned by an air hose.

Slides were used to show the wide variation encountered in use. For example, operation at summer temperatures is far different from operation in winter weather. So far, summer operation has been stressed. For winter operation there is much over capacity and temperature changes from 90F in summer to 0F or lower in winter cause peculiar actions.

For example, in winter operation when the compressor is off and the outside air temperature is lower than the evaporator temperature, gas will go to the condenser, that is, in this case back pressure will not build up and a solenoid valve is installed in the line for evaporator control and such conditions. Slides were shown illustrating several designs for winter operation involving the use of refrigerant control and winter control valves. Slides were also shown where a high pressure cut in switch was used on the condenser fan motor for cold weather operation.

The only problem involved is that of removing heat. Water condensers have been used singly or in combination with air, but there are limitations of water application. There is no control over the water used. It may not work as well in one location as in another. Industry has turned to wet condensers but air and water introduce corrosion. Air condensers, he said, have eliminated all of these problems. If the engineering design is made to fit the application there is no problem and the superiority of air cooled condensers becomes readily apparent.

## Safety Drive Started

A DRIVE has been launched by the ice, cold storage and locker plant division of the National Safety Council to establish more interest in accident prevention work. As a means to that end a publicity program is being developed by W. F. Leonard, The Southland Corp., Dallas, Tex., chairman of the committee. Mr. Leonard in a recent letter asks all those interested in safety work to contribute their safety program, ideas, pictures, and outstanding safety records.

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## Air Purification

*(Continued from page 19)*

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## Practical Refrigerating Engineers Association

APPROXIMATELY 66 members attended the February 4 meeting of the Chicago Practical Engineers Association at which an exhibit presented the "Ammonia Thermobank System" consisting of a working model in full operation. Otto Nussbaum, chief engineer of Kramer Trenton Company spoke on the many features of this system. He was assisted by I. H. Cohler, president of the I. H. Cohler Company. Some slides were shown indicating the many steps in the development of the present Thermobank units from the first experiment over 80 years ago.

The association welcomed four new members and satisfactory reports on the new Data Book.

The panel discussion on the topic "Servicing of Commercial Refrigerating Equipment" was handled by members Tony Volman, A. M. Reilly and Ernst Jaeschke with moderator W. H. Motz. The discussion included two stage systems and problems of insulation.

At the February 18 meeting, an interesting exhibit was shown by the Mid-West Heating Service with a model Worthington Air Conditioner in operation. The guest speakers were John M. Peterson of the Worthington Company in Chicago and Alex Weiss and Herbert Zalzman, both of the Mid-West Heating Service. The speakers talked on these units, describing the various uses and some of the details concerning controls and valves. There were many questions from the floor indicating much interest in the subject.

The business meeting considered a satisfactory Data Book report, auditor's report on financial condition of the Association and social committee report on the proposed May party to be held May 20.

W. H. Motz conducted an instruction period on "Single and Multiple Dry Type Air Cooled Condensers."

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## Refrigerated Brewery Fermentation Cellar Burns

ACCORDING to newspaper reports, it was heat used to melt insulation application materials that kindled the gas-emitting fire at the Newark plant of Anheuser Busch, Inc., on March 11, 1953. Thirteen workmen died apparently of asphyxiation, and 25 others were injured or suffered from smoke inhalation. The Newark plant, an annual producer of 1¼ million barrels of Budweiser, was undergoing additional expansion, a six story fermentation cellar. This building 75 feet high contained 24 tanks approximately 30 x 50 feet. A good many of the deceased were found in the tanks on the upper floors. The reports overlooked the occupation or the occasion for the men to be in the tanks.

A New Jersey State Deputy Director of Labor, according to accounts reaching this magazine, is stated as attributing the toxic gas condition to ignition of the insulation. The insulation was apparently supported in combustion by the application adhesive which was most likely the original material kindled, the deputy implied.

Rescuers and firemen employed oxygen masks and had to climb along pipe and plank construction scaffolds to get at the trapped men. Compressed air was forced into the building and holes chopped through concrete roof in order to vent the building of the dense gas and smoke generated by the fire.

Anheuser-Busch, Inc., built the plant in 1951. Prior to that time their largest installation, the largest brewery in the world, was located at St. Louis, Mo. They also have a plant in New Orleans, a small by-products installation. Recently they undertook construction of another multi-million dollar, million barrel producing unit in the San Fernando Valley just outside of Los Angeles, Calif.

## Dairy Prices Supported At 90 Per Cent Parity

DAIRY product prices will be supported at 90 percent of parity for another year beginning April 1, according to an announcement made by Secretary of Agriculture, Ezra Taft Benson. This decision followed the recommendation of the Dairy Advisory Group, Congressional leaders, farm leaders, and others who had been consulted.

"A primary reason for continuing the maximum support allowed by the law," according to Secretary Benson, "was assurance from the dairy advisors that the industry would immediately start work on programs to reduce to a minimum governmental support purchases. The year will give the industry time to demonstrate to what degree it can solve its own problems.

A representative "work conference" including farmers and leaders of their organizations, processors, distributors, retailers, and consumers will be called together at once. Each segment of the dairy industry will be asked to send representatives prepared to assume definite responsibility for a portion of the solution of the dairy problems. Secretary Benson said, for example, "Dairy farmers can shift more rapidly to fluid milk sales and away from butterfat.

"Milk companies can move more milk from butter producing areas into regions needing fluid milk. Retail dairies, stores and consumers can more actively promote the sale of milk and milk products. There are other adjustments which the industry can make to reduce the accumulation of surplus dairy products. The U. S. Department of Agriculture has offered to help and the assistance of the Agricultural Colleges, Experiment Stations, and Extension Services can be depended upon," the secretary stated.


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# CONVENTION CALENDAR

**SOUTHWESTERN ICE MANUFACTURERS ASSOCIATION**
April 8-10, 1953
Gunter Hotel, San Antonio, Texas
P. A. WEATHERRED, Secy-Counsel

**EASTERN STATES ICE ASSOCIATION**
April 9-10, 1953
Hotel Chamberlain, Old Point Comfort, Va.
GORDEN T. WILSON, Secretary

**VIRGINIA ICE MANUFACTURERS ASSOCIATION**
April 9-10, 1953
Hotel Chamberlain, Old Point Comfort, Va.
H. H. SNYDER, Secretary

**INDIANA ASSOCIATION OF ICE INDUSTRIES**
April 15-16, 1953
Lincoln Hotel, Indianapolis, Ind.
ROBT. W. WALTON, Secretary

**ILLINOIS ASSOCIATION OF ICE INDUSTRIES**
April 24, 1953
Emmerson Hotel, Mt. Vernon, Ill.
WM. D. WRIGHT, Secretary

**THE REFRIGERATION RESEARCH FOUNDATION**
May 15-17, 1953
Shoreman Hotel, Washington, D. C.
H. C. DIEHL, Director

**NATIONAL ASSOCIATION REFRIGERATED WAREHOUSES**
May 17-21, 1953
Shoreman Hotel, Washington, D. C.
WM. DALTON, Exec. Vice-Pres.

**AMERICAN WAREHOUSEMEN'S ASSOCIATION**
May 17-21, 1953
Shoreman Hotel, Washington, D. C.
WM. DALTON, Exec. Vice-Pres.

**NATIONAL ASSOCIATION PRACTICAL REFRIGERATING ENGINEERS**
November 11-13, 1953
Purdue University, Lafayette, Ind.
J. RICHARD KELAVAN, Secretary

## Railways Ice Moves Accounting Office

THE operating and accounting offices of Railways Ice & Service Company were moved to Kansas City, Kan., March 1, 1953. The executive offices will continue in Chicago at the present address. Frank D. King, vice-president and general manager, and long time member of the Chicago Chapter NAPRE, retains his office at the Chicago address. A. R. Carlson, junior past president of NAPRE, has been appointed vice-president of the Southeastern Public Service Company of which Railways Ice & Service Company is a division. Mr. Carlson, better known to his associates as "Rudy" also retains his office at Chicago and continues as chief engineer of the Railways Ice & Service Company Division.

Glenn Greene, for many years in charge of the accounting office at Chicago, has been elected vice-president, and will head up the accounting office at Kansas City. His assistant will be G. R. Jackson, who also moves from Chicago to Kansas City. Mr. Jackson's title is secretary-treasurer.

Railways Ice & Service Company maintains ice manufacturing and service plants in Chicago, Illinois, two at Memphis, Tenn.; others at Kansas City and Topeka, Kansas, and at Belen and Clovis, New Mexico; Alva, Shattuck, Woodward and Waynoka, Oklahoma; Mt. Vernon, Aurora, Cassville and Monett, Missouri, and Willard, Ohio.

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NEBRASKA ASSOCIATION OF ICE INDUSTRIES
Frank Vogelsang, Secretary
W. T. Good Ice Co., Lincoln, Nebr.

NEW ENGLAND ICE ASSOCIATION
Raymond Wilber, Secretary
83 Winter St., Providence, R. I.

NEW JERSEY STATE ASSN., N.A.R.W.
Robert E. Baker, Secretary
Kaighn Avenue & Delaware River
Camden, N. J.

NEW YORK STATE ASSN. REF. WAREHOUSES
Garth A. Shoemaker, President
Hygeia Refrigerating Co., Elmira, N. Y.

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160 Kinsley Avenue
Providence 3, R. I.

NORTH CAROLINA ICE ASSOCIATION
Lewis H. Powell, Secretary
Capital Ice & Coal Co., Raleigh, N. C.

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Alex Olsson, Chairman
Terminal Ice & Cold Storage
Portland, Ore.

NORTHWEST ASSOCIATION OF ICE INDUSTRIES
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1539 N. E. 37th Ave., Portland, Ore.

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The Steubenville Ice Co., Steubenville, O.

OKLAHOMA ASSOCIATION OF ICE INDUSTRIES
Harry T. Hudson, Executive Secretary
525 Cravens Building 7, Oklahoma City, Okla.

PACIFIC STATES COLD STORAGE WAREHOUSEMEN'S ASSOCIATION
Jack L. Dawson, Secretary
461 Market St., San Francisco, Calif.

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Margaret L. Kinder, Secretary
Box 293, Kingstree, S. C.

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National Ice & Cold Storage Co.
San Francisco, Calif.

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Richard W. Florrid, Secretary
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Tampa Cold Storage & Warehouse Corp.
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Southern Ice Company
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SOUTHWESTERN ICE MANUFACTURERS ASSN.
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WEST VIRGINIA ASSOCIATION OF ICE INDUSTRIES
E. Dane Smith, Secretary
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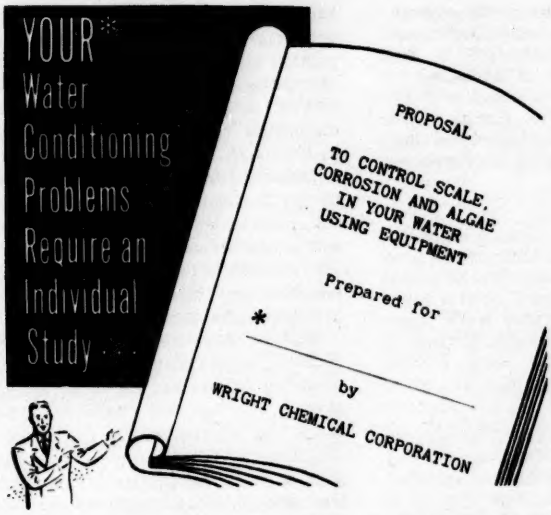
Paul H. Hoff, Secretary
1300 East Locust St., Milwaukee, Wis.


YOUR* Water Conditioning Problems Require an Individual Study ···
PROPOSAL
TO CONTROL SCALE, CORROSION AND ALGAE IN YOUR WATER USING EQUIPMENT
Prepared for
*
by
WRIGHT CHEMICAL CORPORATION

A report like this, prepared especially for you, can save you hundreds and often thousands of dollars in unnecessary maintenance costs and production losses.

Wright Water Conditioning Service is *complete!* It starts with a scientific laboratory analysis of your individual water condition problems, followed by a written proposal for the solution. After you adopt our recommendations, we make constant checks to insure proper performance.

This Wright Service is available without cost or obligation. Write us or call your Wright Field Engineer today for a complete survey of your specific water conditioning problems.

**WRIGHT CHEMICAL CORPORATION**
GENERAL OFFICES AND LABORATORY
633 WEST LAKE STREET, CHICAGO 6, ILLINOIS

Offices in Principal Cities
Distributors of Nelson Chemical Proportioning Pumps and Refinite Softeners and Other External Treating Equipment.

Wright CHEMICALS
Specializing in Water Conditioning

# COILS • PIPE FABRICATIONS

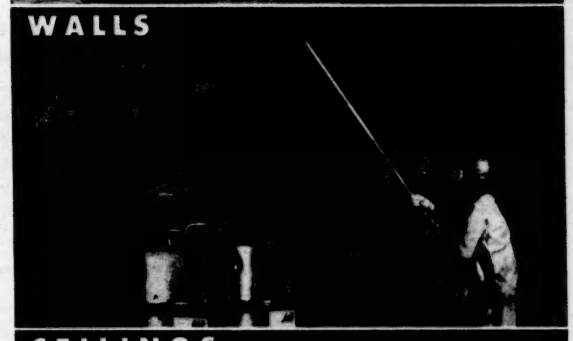
Submit drawing or B/P for estimate.

From complicated coils of ¼-inch copper to mammoth bends of 4-inch and larger iron pipe, CHICAGO NIPPLE is equipped to form your coils and pipe fabrications to your *exact* designs and specifications.

You'll be delighted at our reasonable prices—surprised at our prompt deliveries.

## CHICAGO NIPPLE MFG. CO.
**1997 Clybourn Ave., Chicago 14, Ill.**

# Specify Laykold® for cold insulation construction



**These easy-to-use LAYKOLD products are applied cold, with spray, brush or trowel**

- **LAYKOLD INSULATION ADHESIVE,** for vapor barriers and for holding all types of insulating materials.
- **LAYKOLD CEMENT,** a special product for holding rigid-type insulation on masonry or concrete surfaces.
- **LAYKOLD WEATHERCOAT,** for protection of exposed insulated surfaces.

*Send for Illustrated Bulletin*

AMERICAN Bitumuls & Asphalt COMPANY

200 BUSH ST., SAN FRANCISCO 4, CALIF.
E. Providence 14, R. I. Perth Amboy, N. J. Baltimore 3, Md. Mobile, Ala.
Columbus 15, Ohio Tucson, Ariz. Seattle, Wash. Baton Rouge 2, La. St. Louis 17, Mo.
Inglewood, Calif. Oakland 1, Calif. Portland 7, Ore. Washington 6, D. C. San Juan 23, P. R.

## DEATHS

W. VERNON BRUMBAUGH, 57, Executive Secretary of the Refrigeration Equipment Manufacturers Association of Washington, D. C., died early Saturday morning, February 14, at Suburban Hospital, Bethesda, Md., of a sudden heart attack. Mr. Brumbaugh was a veteran in the trade association field having served for the past 25 years representing manufacturers and distributors through national associations. He was a member and past president of Washington Trade Association Executives, also a member of the American Trade Association Executives and the Trade Association Excutives Forum of Chicago.

GEORGE YOUMANS, 72, Jersey City, New Jersey, died February 21, at the Jersey City Medical Center. He was a former employee of the Bayonne Naval Base and previously was engaged in the wholesale ice business in Jersey City for many years.

EDWARD M. LIGHTNER, 83, who manufactured ice in Gettysburg, Pa., for many years, died Feb. 9. His widow and three sons survive.

WILLIAM D. KENNEDY, 60, superintendent of the Rochester Refrigeration Company, Rochester, N. Y., died March 2. A resident of Rochester for 40 years, he was associated with the Rochester Ice & Coal Company for 24 years before becoming superintendent for the Rochester Refrigeration Company.

HENRY CLAYTON CURLEE, Monroe, N. C., who had been with the Monroe Ice and Fuel Company for 26 years, died suddenly February 13 of a heart attack. He retired from work three years ago due to ill health. He is survived by his widow, Mrs. Lennie Curlee, two daughters and two sons.

HENNING N. BORGSTEDT, associated with DeLaVergne Machinery Company for more than forty years died at Newport Hospital, Newport, R. I. November 30. He was 82. Mr. Borgstedt received his technical education at Chalmers Institute of Technology.

### New Standards of Rating Air Conditioners

A PROPOSED Standard on Methods of Rating and Testing Air Conditioners (16-53) which is a revision of Standard 16-R, bearing the same title, has been released by The American Society of Refrigerating Engineers. This latest revision affects primarily the room air conditioner portion of the Standard and is for the purpose of providing alternate testing methods in addition to the calibrated room originally specified in Standard 16-R and to which some objections had been raised. Included in the Standard are the cooling and the heating and other functions of self contained air conditioners, room air conditioners, remote type air conditioners, heat pumps, and oil and gas fired air conditioners.

The calibrated room calorimeter specified in the Standard is primarily intended for testing room air conditioners of the free delivery type. Since this apparatus does not require attachments to air inlets or outlets, it avoids the possibility of influencing the ratings, as might be the case where such attachments are applied to certain types of room air conditioners.

The methods of rating and testing forced circulation and natural convection air coolers Standard has been revised to change the method of calculating the cooling capacity from a net cooling effect to a gross total cooling effect. This publication is now known as Standard 25-53. These Standards may be obtained from ASRE Headquarters.

**WELDED – ICE CANS – RIVETED**
HIGH PRESSURE; LOW PRESSURE; A.P. CANS

**– ICE CAN GRIDS –**
VARIOUS DESIGNS, STYLES & WEIGHTS

**ACCURATE CAN FILLERS**
FOR ANY NUMBER OF CANS

WILL NOT LEAK OR DRIP
ACCURATE MEASUREMENT EACH FILLING
**THE SANITARY FILLER**

• CORE FILLERS • CORE SUCKERS • BRINE TESTING KITS
• FROZEN FOOD LOCKERS • FREEZER TRUCKS & PANS

CABLE ADDRESS — KNICKSTACO

**KNICKERBOCKER STAMPING COMPANY**
PARKERSBURG, W. VA.

## New Plants And Improvements

*Blythesville, Calif.* — Construction has started on a new plant for the vacuum cooling and packing of lettuce by the Vacuum Cooling Company. Cost of the installation, it was announced, will be about $300,000.

*Corono, Calif.* — The Exchange Lemon Products Company plans to add a cold storage warehouse addition to its ice plant, according to D. F. McMillan, general manager.

*San Francisco, Calif.*—The Wilcox Frozen Foods Company is building a new frozen foods warehouse to provide an additional 3,000,000 pounds of storage facilities.

*San Jose, Calif.* — The Union Ice Company is constructing a new frozen food storage at a total cost of about $250,000. The new frame-stucco building will contain 21,000 cubic feet of storage space.

*Vernon, Calif.*—The Zest Provision Company has let contract for a concrete block meat processing plant.

*Delhi, Ont., Canada.*—The new ice plant at Delhi Community Arena was officially opened March 17. A feature skating program was the main attraction of the evening.

*Chicago, Ill.*—The Produce Terminal Cold Storage Company has started to build a new warehouse to connect by a tunnel with the main warehouse. It will have about 35,000 sq ft and will cost about $1,100,000.

*Independence, Mo.*—The Independence Ice & Creamery Company has built a new curing and processing plant to expand its freezer locker service.

*New Orleans, La.* — The Tropical Ice & Cold Storage Company is adding 137,000 cubic feet of freezer storage space.

*Malone, N. Y.*—The Upstate Storage Inc is building a new refrigerated warehouse with 25,000 sq ft of storage space for both freezers and coolers.

*Florence, Okla.*—A new ice plant is under construction to be operated by Aubrey Matthews and Dewey Fritz.

*Auburn, Wash.*—The Auburn Ice Cream Company has plans for a new ice cream plant with refrigerating facilities.

*Bellingham, Wash.* — A new cold storage warehouse addition for the Port of Bellingham will be constructed at a cost of $308,000. It will have a double concrete floor with cork insulation between slabs.

*Stanwood, Wash.* — The Glacier Cold Storage Inc. has been incorporated with capitalization of $200,000 to build a new refrigerated warehouse.

*Tacoma, Wash.*—Contract for construction of a new cold storage addition to cost $163,550 has been awarded by Kelley-Farquahr & Company, food processors and packers. It will include an 85 x 150 ft holding room and a 60 x 150 ft processing room.

## Fire and Accident Record

*Van Buren, Ark.*—The Van Buren branch of the Ward Ice Industries plant was damaged by fire of undetermined origin. Amount of loss was not announced, but it was said to be extensive.

*Columbus, Ga.*—The Atlantic Ice & Coal Co. estimated damage of several thousand dollars from an early morning fire. Last July a fire caused estimated damages of $100,000.

*Emporia, Va.*—Fire of undetermined origin destroyed the Emporia plant of the Refrigeration Engineering Corporation, with damage of $500,000. The plant employed 150 people.

*Rawlins, Wyo.* — A fire believed started by a transient who had built a fire to keep warm caused considerable damage to the Rawlins Ice & cold storage plant. The plant continued operating.

## Sales and Reorganizations

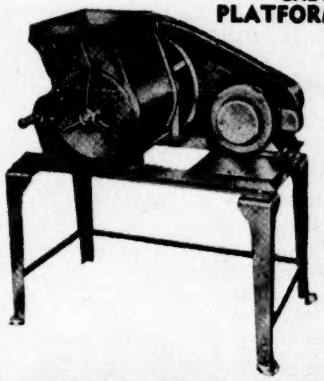
*New York, N. Y.*—The old Knickerbocker Ice Company plant at Northern Boulevard and Susquehanna Avenue in Great Neck, L. I. has been purchased for personal investment by Joseph K. Alliger and Hyman Rattner of the Sterling Investment Corp.

*Charleston, S. C.*—The Southern Ice Company has purchased the plant of the Crystal Ice Company for $45,000. The Southern Ice Company will continue to operate the plant.


**BATEMAN CRUSHER**

***For Ice Station or Store***

**Model 25 Special**
**GALVANIZED**
**PLATFORM CRUSHER**



Bateman Crusher has four operating adjustments of the sizing grate that sizes ice from drug store to 1¼".

Hopper opening takes a 25-lb. block of ice.

The legs are 24 inches high, allowing a 25-lb. paper bag to rest under crusher. Has spout for filling paper bags.

Takes only 30 seconds to grind 25-lb. block of ice.

Due to drum and pick design, only a ¼ H.P. motor is required to operate this crusher.

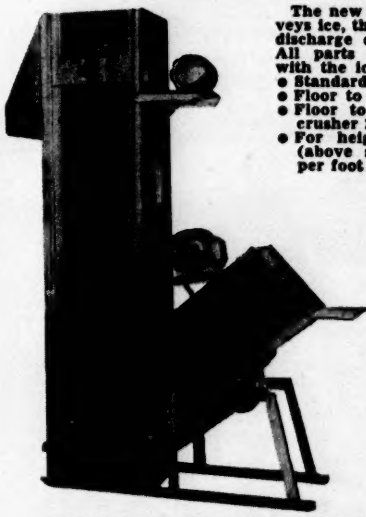
A metal guard covers the fly wheel, belt and motor pulley.

**SPECIAL PRICE: CRUSHER COMPLETE with ¼ h.p. motor, $145.00**
**Without Motor, $130.00**
**FOB Mineral Wells, Texas**

**Bateman**
*Ice Processing Equipment*

**BATEMAN CRUSHED ICE ELEVATOR**

**WILL DELIVER APPROXIMATELY 10 TONS OF ICE PER HOUR**



The new Bateman Elevator conveys ice, that has been crushed, to discharge chute for bagging, etc. All parts that come in contact with the ice are galvanized.

- Standard height 7' 6".
- Floor to discharge chute 72".
- Floor to top of hopper under crusher 24".
- For heights taller than 7' 6" (above standard height) $25.00 per foot additional.

**FEATURES:**

- V-belt drive from motor to gear box.
- Gears are enclosed and run in grease.
- ½ HP. motor to drive elevator.
- Top and bottom sprocket shafts run on roller bearings.
- Connecting chains for cups are of steel and galvanized.
- Cups do not ride sides of elevator.
- Take-up slack on chain is outside of housing for easy adjustment.
- At bottom of housing, pull-out pan provides easy cleaning of any left over crushed ice.

**The Bateman Elevator can be ordered without crusher, as the Bateman Elevator will work with any crusher.**
**Price of Elevator, less motor.....$450.00**
**Elevator with Monarch Crusher, less motor.....$685.00**
**Monarch Crusher takes a one HP. motor.**
**(Motors at prevailing prices.)**

# What's New

MACHINERY
APPLIANCES • PROCESSES

## New Plastic Coating

A NEW plastic coating for use as both protection and color identification on insulated refrigerant, cold water, steam and other lines and insulated equipment has been developed by the Armstrong Cork Company. The new finish, called Insulator, is a tough plastic coating that can be either brushed or sprayed on.

Insulcolor will withstand temperatures to 160 F without cracking, shrinking, or crazing. It may be used over heat insulations, cork pipe covering and lagging, and also as a finish over cork-insulated air conditioned ducts. It is available in white and six colors—light and dark green, light and dark blue, yellow and buff. For jobs where color is not desired or required for line identification, white provides an attractive, sanitary surface. It can be applied over standard asphaltic finishes without danger of bleed-through.

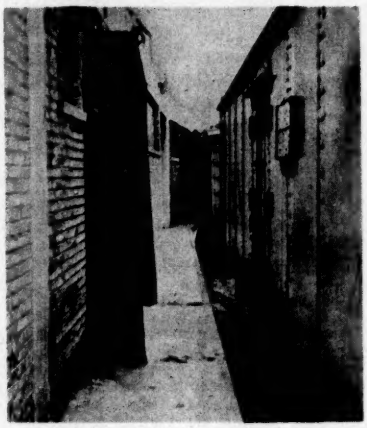
The tough finish furnishes high resistance to bumping and abrasion. It has high water resisting properties which make it suitable for either inside or outside applications. No inflammable solvents are used, so that it is safe to use on the job.

Insulcolor reduces maintenance on insulated lines to a minimum. Dust, dirt, grease, oil and soot can be readily washed off its smooth surface. On indoor and outdoor lines and equipment it lasts for many years without recoating. It can also be used as an adhesive for pasting down canvas, asbestos, and other lagging cloths, thus eliminating the need for sewing the material. When used as an adhesive for lagging, it is diluted with water.

Base white Insulcolor and the color tint desired are shipped in separate containers and mixed on the job. The white base is supplied in 3½ gallon pails, containing three gallons of the material, which allows space for mixing. Coverage is 35 to 50 square feet per gallon in two-coat application, depending on the surface being finished.

## Loading Dock Shelters

LOADING dock shelters of canvas and a collapsible steel frame are being manufactured by the Atlas Products Co., Chicago, Ill. These shelters are designed to extend from building to truck or car loading doors. When not in use they collapse flush against the building. Each of the several standard models can be adapted to fit any unusual condition of use. Shown in the picture is a recent typical Atlas installation.

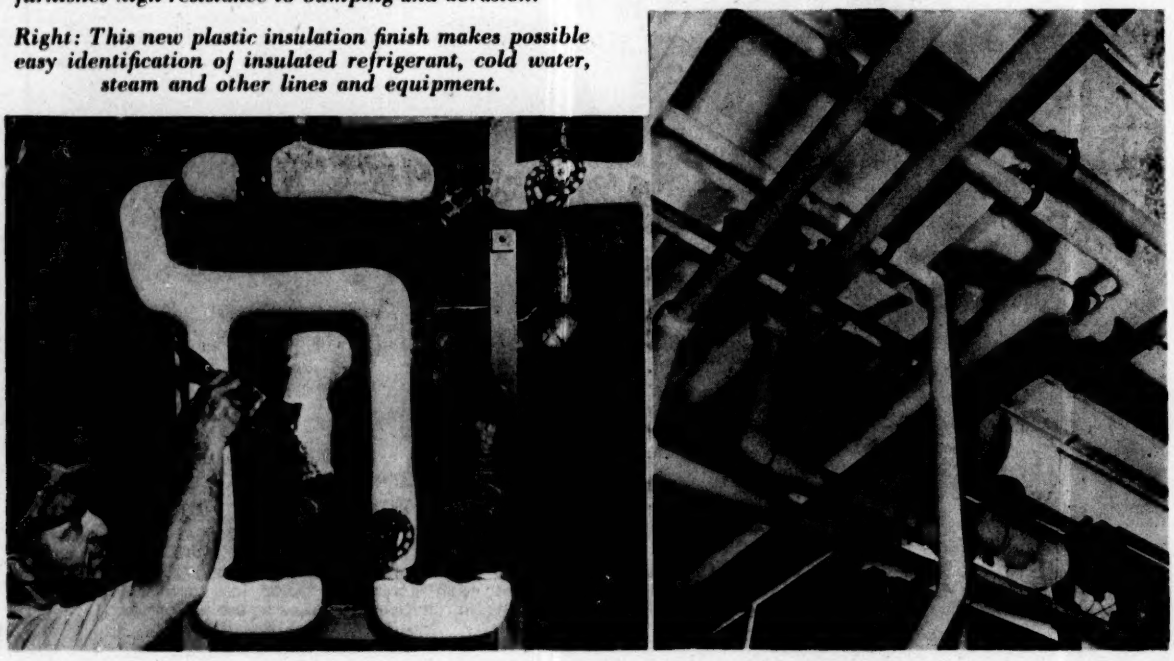


*Atlas Loading Dock Shelter*

Available on request from the Atlas Products Co. is a new booklet, illustrating in detail the various standard models and giving other pertinent information.

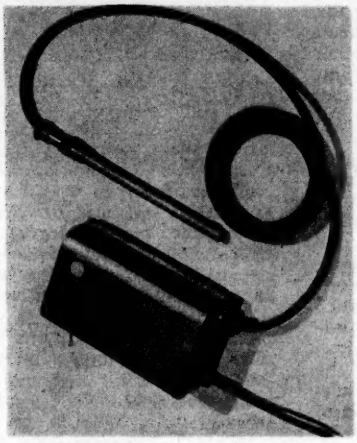
***Insulcolor may be applied as shown below by brush or spray gun on insulated refrigerant, cold water, steam and other lines and equipment to provide both color identification and an insulation finish. The tough film also furnishes high resistance to bumping and abrasion.***

***Right: This new plastic insulation finish makes possible easy identification of insulated refrigerant, cold water, steam and other lines and equipment.***



## Electronic Liquid Level Control

BASED on the capacitive action of liquid surrounding a porcelain-enamel-covered-electrode, the new Belmont Level Control provides adjustment of liquid level and cut-in, cut-out differential over very wide limits. In operation, the new unit consists of the probe which is mounted directly at the location of the controlled liquid; a connecting cable which can be 1000 feet long if necessary; and the control unit which can thus be located for operating convenience. The two main controls (liquid level and differential) are designed for screwdriver adjustment while a vernier or fine control on liquid level is operated by a panel-front knob.



*New Belmont Level Control*

Standard models operate from 115-volt 60 cps supply while special units are available for 230-volt or 25 cps operation. The snap-action relay included in the unit is rated for 10-amp at 115 and 230 volts. An indicator light in the panel front indicates operation of the relay, burning at full brilliance when the relay is open, at half brilliance when the relay is closed.

The differential range varies with the type of service but, as an example, for ammonia control the standard unit operates between approximately 1 in. and 5 in. Wider ranges can be supplied with special units. Among the applications which suggest themselves are low-side refrigerant-level control in refrigeration plants; liquid level, interfact, proportioning and blending control in petroleum refineries; level control for production, packaging or production checking in chemical plants; filler, measuring, mixing and operation controls in food processing plants; and similar and related applications in dairying, brewing and other industrial fields.

## New Rat Killer

A NEW rat killer comes in six different flavors and odors covering the main rat favorites, one of which is sure to be effective. The product is called Rat Krax and each flavor comes packed in an easily identifiable one pound container designed to serve as a bait can. Warfarin is the active poison used in Rat Krax. It is manufactured by Koch Supplies, 2520 Holmes St., Kansas City 8, Mo.—Cold Facts.


7 reasons why THERMOBANK by Kramer is the Standard of the Industry

THERMOBANK FOR AMMONIA

The unequaled completely automatic defrosting system for temperatures below 32°

1 **COMPLETELY AUTOMATIC**
It requires absolutely no manual attention. The coil is always frost free — automatically.

2 **PART OF LARGE SYSTEM**
It may become part of large existing systems without affecting the operation of the other evaporators.

3 **MAXIMUM EFFICIENCY**
Positive operating economy is provided by a "frost free" coil, using the patented KRAMER ICE COAT CONTROL.

4 **FLOOR SPACE ECONOMY**
The KRAMER AMMONIA THERMOBANKS are ceiling mounted and therefore take no precious floor space. All defrosting devices are outside the refrigerated space.

5 **SIMPLICITY**
Minimum controls — standard, time-tested and easily obtainable — are used in the KRAMER AMMONIA THERMOBANK.

6 **NO DRAIN FREEZE-UPS**
Drain pan and drain line are heated during defrost, eliminating any drain line freeze-ups.

7 **TEMPERATURE CONTROL**
Uniformity of temperature is made possible by the shortest-time defrost, characteristic of THERMOBANK.

WRITE NOW FOR BULLETIN NO. TA-182

KRAMER TRENTON CO.
Trenton 5, N.J.

# MANUFACTURERS' NEWS

## Roots-Connersville Announces Promotions

THE promotion of E. P. Roudebush to vice-president and works manager has been announced by R. H., Owens president of the Roots-Connersville Blower Division of Dresser Industries, Inc. He will be in charge of all manufacturing activities at the

*E. P. Roudebush*

Connersville, Ind. and Delaware, Ohio plants. Mr. Roudebush is a native of the State of Ohio and is a graduate of Ohio State University. From 1930 to 1944 he gained varied and valuable experience in the manufacturing field by being connected with several manufacturing companies. In 1944, he

*D. A. Johann*

joined the parent company, Dresser Industries, Inc., as Director of Industrial Engineering, coming to Roots-Connersville in January, 1950, as assistant to the vice-president in charge of manufacturing. He has been works manager since January, 1951.

D. A. Johann has also been promoted to vice-president in charge of sales, Mr. Johann will be in charge of all sales and advertising activities of the company. He is a native of Pennsylvania, and a graduate of Pennsylvania State College. From 1927 to 1946 he gained valuable sales experience with a manufacturer of electrical and mechanical equipment. He joined the Roots-Connersville organization in 1946 as manager of the Chicago District Office. Since January, 1951, he has been general sales manager.

## Armstrong Cork Consolidates Production

PLANS to consolidate all of its corkboard and cork pipe covering production in one plant at Beaver Falls, Pa. has been announced by Armstrong Cork Co. The company's other cork insulation plant, located at Camden, N. J., will be placed on a standby basis after the consolidation program is completed early in 1954.

H. R. Peck, vice-president and general manager of Armstrong's building materials division, explained that for nearly half a century the two plants have been producing virtually the same products. "However, technological improvements," he said, "now enable one plant to turn out as much volume as both together could produce a few years ago, and consolidation is clearly in order. Since the Beaver Falls factory produces a number of other products, in addition to cork insulations, it is economically more desirable to concentrate the operations in Beaver Falls, rather than in Camden. The consolidation will result in greater manufacturing efficiency, better coordination, and further improvement in service."

After production is halted at Camden late this year, some of the equipment will be moved to Beaver Falls and employment at the latter plant will be expanded from 425 to approximately 500, Peck said. He stated that "a few key employees" at Camden will be transferred to other positions and the remainder will be provided for through paid-up annuities and severance payments.

## National Rejectors Opens Dallas Service Center

THE opening of a new service center located at 3202 Knox Street, Dallas 5, Texas is announced by National Rejectors Inc., St. Louis, Mo. This branch office is the fifth such center in the United States and will serve the Southwest, including the following states: Arkansas, Louisiana, Oklahoma, New Mexico and Texas. The Dallas Service Center is fully equipped to handle all repairs, parts and training of servicemen in the maintenance of National's highly specialized equipment. In addition to the Dallas Office, National maintains other service centers in New York, Chicago, Los Angeles, Atlanta, and St. Louis.

## Sporlan Valve Adds to Engineering Staff

THE appointment of Don B. Rentschler and Edward F. Kounovsky to augment its present sales and engineering staff is announced by the Sporlan Valve Co.

*DON B. RENTSCHLER* *EDW. F. KOUNOVSKY*

Before joining Sporlan, Mr. Rentschler was associated with the Ajax Corporation of America as service manager. Prior to that, he was an application engineer for Servel Inc. He received his B.S. degree from the United States Naval Academy at Annapolis. After graduation he served as Assistant Gunnery Officer aboard a destroyer and later as a fighter pilot. He will work in the St. Louis sales office, handling application engineering and all technical matters which are related to sales and field service.

Ed. Kounovsky attended Washington University in St. Louis. His background in the refrigeration and air conditioning field, particularly in the application of controls, includes seven years with the General Engineering and Manufacturing Company of St. Louis, in this company's engineering department. He was also associated with the Emerson Electric Manufacturing Company, and came to Sporlan from Sunnen Products Company also of St. Louis.

The addition of Rentschler and Kounovsky to the Sporlan sales and engineering staff is planned to provide increased application and service assistance to Sporlan Valve customers.

## Ice Plant Equipment Co. Acquires Majority of Martocello Inventory

IN A recent purchase Albert L. Ribiero, president of Ice Plant Equipment Co., Inc., 2543 Frankford Ave., Philadelphia 25, Pa., announced the acquisition of the majority of the inventory of the well known Jos. A. Martocello & Co. which has discontinued business. Mr. Ribiero stated the purchase included all patterns and dies of the Martocello Co. enabling the Ice Plant Equipment Co. to fill all orders for any type air system for manufacturing clear raw water ice.

## Motz Named Williams Product Manager

DONALD F. MOTZ has been appointed Product Manager of the Williams Division, Eureka Williams Corporation, Bloomington, Ill., it has been announced by Andrew F. Ward, General Sales Manager of the division. Mr. Motz will do liaison work

*Donald F. Motz*

between the Williams Division sales and engineering departments and will head product application engineering for the Williams Air-O-Matic residential air conditioning and Oil-O-Matic and Gas-O-Matic forced air heating units. He will also direct the technical and application engineering education program for Williams employees and dealers.

Mr. Motz was recently Chief of the Tank Automotive Branch, Contract Administration Division, Chicago Ordnance District and has an extensive background in the air conditioning and heating field. Previous to his ordnance work, he was assistant chief engineer for Air Comfort Corp., Chicago.

## Carrier Reports Increased Net Profits

NET profit of Carrier Corporation for the twelve months ended January 31, 1953, was $4,613,476 or $4.64 per common share, as compared with $3,441,034 or $3.73 per common share for the preceding similar period. Before income and excess profits taxes, Carrier earned $12,631,476 during the twelve months ended January 31, 1953. The comparable figure for the corresponding period a year earlier was $10,027,034. Income and excess profits taxes per common share for the two periods were $8.53 and $7.60, respectively. Earnings and tax figures have been adjusted in each instance to reflect retroactive changes in previous tax accruals.

Per share earnings and taxes are calculated on the basis of the common stock outstanding at the close of each period. Reflected therein is an increase from 866,229 shares to 940,403 shares as a result of a substantial conversion of both issues of preferred stock, which has taken place in recent months. The conversion rates for the 4 per cent and the 4.8 per cent series are, respectively, 1.6 shares and two shares of common for each share of $50 par value preferred.

During the period under review, completed sales totaled $120,097,479 and new orders were booked in the amount of $115,466,415. The comparable figures for the twelve months ended January 31, 1952, were $81,-325,187 and $77,993,541 respectively.

On January 31, 1953 the corporation had a backlog of unfilled orders amounting to $41,848,543 as compared with $35,276,679 a year earlier.

## New Bulletin on Instrument Gages

A NEW 24-page bulletin (98214) has been released by the Taylor Instrument Companies. It describes the latest development in 6-inch Dial Indicators for temperature, pressure and load applications. It is generous in illustrations and supplies considerable information on features, dials and scales available.

For temperature instruments, a variety of sensitive elements or bulbs are clearly explained and the recommended applications for each, present an easy means for their selection.


AIR GAS AMMONIA

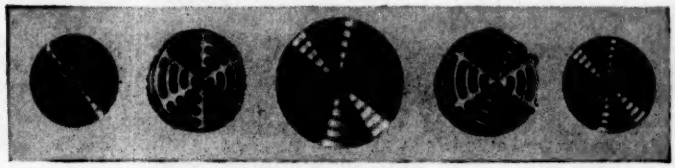
compressor operators

do you want peak performance

- Quiet, vibration-free operation
- 20 to 60% more valve area
- Less power consumption
- Low pressure loss
- Normal discharge temperature
- Lower operating costs

if you do . . . investigate the established advantages of VOSS VALVES for your machines.

VOSS VALVES are made to specifications, machined from solid stock (not cast)—PLATES are machined and ground (not press formed) for precise high-tolerance fit; VALVES and PLATES are of heat-treated alloy and stainless steel; the PLATES are dimensionally stable, ductile, resist fracture, high temperatures and corrosion; withstand fatigue; won't chip, crack or score cylinder walls.



To increase the efficiency of your compressor, send us the name, bore, stroke and speed of your machine. Our detailed proposal will be sent without obligation.

VOSS VALVES

J. H. H. VOSS CO. INCORPORATED

783 East 144th Street, New York 54, N. Y.

## IMPORTANT NOTICE

# ICE PLANT EQUIPMENT COMPANY, Inc.
## ACQUIRES THE MAJORITY OF THE INVENTORY OF JOS A. MARTOCELLO & CO.

**We announce to the Ice Industry that the ICE PLANT EQUIPMENT CO. Inc., has acquired by purchase the majority of the inventory and all patterns and dies of JOS. A. MARTOCELLO & CO., which has discontinued doing business.**

**ICE PLANT EQUIPMENT CO. Inc. can fill ALL orders for ANY TYPE Air System used for the manufacture of clear raw water ice.**

**Prompt Service and fair dealings will prevail as always with ICE PLANT EQUIPMENT CO. Inc.**

*Write, Wire or Telephone*

**ICE PLANT EQUIPMENT COMPANY, Inc.**

**2543 Frankford Ave.** **Philadelphia 25, Penn.**

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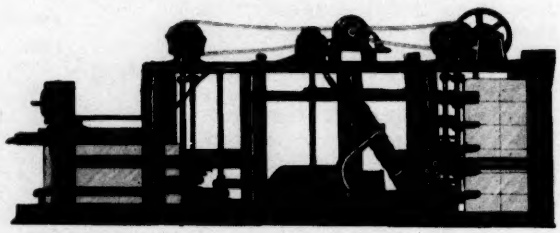
# NOW IS THE TIME TO ORDER YOUR PERFECTION SPECIAL
## HIGH CAPACITY • DEPENDABLE

**NEED PARTS?**
We carry a complete line of Perfection, Miller and Peerless parts, available for immediate shipment.

The Perfection Special is really two machines in one—a combined heading and scoring machine—that receives ice blocks on edge, scores them and discharges them standing on end. Capacity is 4½ blocks per minute or 270 blocks per hour. Sturdily built for long life and dependable, trouble-free operation.



*WRITE, WIRE OR PHONE*

# PERFECTION ICE SCORING MACHINE CO.

**P. O. Box 2140** **Fort Worth, Texas** **Phone EDison 1258**

# THE BUYERS DIRECTORY

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**ABSORBERS**
Frick Co., Waynesboro, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

**AIR COMPRESSORS**
Frick Co., Waynesboro, Pa.

**AIR CONDITIONING EQUIPMENT**
Carrier Corp., Syracuse, N. Y.
Frick Co., Waynesboro, Pa.
Howe Ice Machine Co., Chicago, Ill.
Niagara Blower Co., New York, N. Y.

**AMMONIA COMPRESSOR VALVES**
Frick Co., Waynesboro, Pa.
Howe Ice Machine Co., Chicago, Ill.

**AMMONIA COMPRESSORS**
Creamery Package Mfg. Co., Chicago, Ill.
Dersch, Gesswein & Neuert, Inc. Chicago, Ill.
Enterprise Equipment Corp., Yonkers, N. Y.
Frick Co., Waynesboro, Pa.
Reynolds Mfg. Co., Springfield, Mo.
Vogt Machine Co., Henry, Louisville, Ky.
York Corp., York, Pa.

**AMMONIA CONTROL DEVICES**
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Kramer Trenton Co., Trenton, N.J.

**AMMONIA FLOAT VALVES**
Acme Industries, Inc., Jackson, Mich.
Armstrong Machine Works, Three Rivers, Mich.
Frick Co., Waynesvoro, Pa.
Phillips & Co., H. A., Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.
York Corp., York, Pa.

**AMMONIA MANUFACTURERS**
Armour Ammonia Div., Armour & Co., Chicago, Ill.
Bower Chemical Mfg. Co., Henry Philadelphia, Pa.
du Pont de Nemours & Co., Inc., E. I., Polychemicals Dept., Wilmington, Del.

**AMMONIA MASKS**
Acme Protection Equipment Co., Chicago, Ill.

**AMMONIA PURIFIERS**
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Frick Co., Waynesboro, Pa.
Howe Ice Machine Co., Chicago, Ill.
International Salt Co., Inc., Scranton, Pa.
Vogt Machine Co., Henry, Louisville, Ky.
York Corp., York, Pa.

**AMMONIA RECEIVERS**
Acme Industries, Inc., Jackson, Mich.
Creamery Package Mfg. Co., Chicago, Ill.
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Enterprise Equipment Corp., Yonkers, N. Y.
Frick Co., Waynesboro, Pa.
Howe Ice Machine Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Reynolds Mfg. Co., Springfield, Mo.
Vogt Machine Co., Henry, Louisville, Ky.
York Corp., York, Pa.

**AMMONIA VALVES & FITTINGS**
Dersch, Gesswein & Neuert, Inc. Chicago, Ill.
Shank Co., Cyrus, Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.

**ARCHITECTS AND ENGINEERS**
Greene, Van R. H., New York, N. Y.
Ophuls & Associates, Fred, New York, N. Y.

**ASPHALT PRODUCTS**
American Bitumuls & Asphalt Co. San Francisco, Calif.

**AUTOMATIC CONTROL DEVICES**
Alco Valve Co., St. Louis, Mo.
Armstrong Machine Works, Three Rivers, Mich.
Frick Co., Waynesboro, Pa.
Phillips & Co., H. A., Chicago, Ill.
Rex Engineering & Sales Co., Oklahoma City, Okla.
Sporlan Valve Co., St. Louis, Mo.
York Corp., York, Pa.

**BAGS, ICE**
Index Coupon & Supply Co., La Porte, Ind.
Union Bag & Paper Corp., New York, N. Y.

**BAGS, WATERPROOF PAPER**
Index Coupon & Supply Co., La Porte, Ind.
Union Bag & Paper Co., New York, N. Y.

**BEER COOLERS**
Frick Co., Waynesboro, Pa.
Martocello & Co., Jos. A., Philadelphia, Penna.
Vogt Machine Co., Henry, Louisville, Ky.

**BLOWERS**
Frick Co., Waynesboro, Pa.
Roots-Connersville Blower Corp., Connersville, Ind.

**BOILERS**
Frick Co., Waynesboro, Pa.
Vogt Machine Co., Henry, Louisville, Ky.

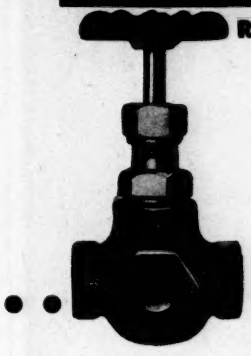
**BOILER TUBES**
Byers Co., A. M., Pittsburgh, Pa.

**BOOKS—TECHNICAL**
Nickerson & Collins Co., Chicago, Ill.

**BRINE CIRCULATORS**
Creamery Package Mfg. Co., Chicago, Ill.
Frick Co., Waynesboro, Pa.
Reynolds Mfg. Co., Springfield, Mo.
Roots-Connersville Blower Corp., Connersville, Ky.
York Corp., York, Pa.

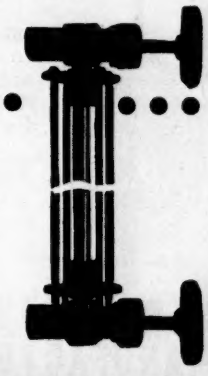
**BRINE COOLERS**
Acme Industries, Inc., Jackson, Mich.
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Enterprise Equipment Corp., Yonkers, N. Y.
Frick Co., Waynesboro, Pa.
Kehoe Machinery Co., Inc., R. P., West Englewood, N. J.
Reynolds Mfg. Co., Springfield, Mo
Vogt Machine Co., Henry, Louisville, Ky.
York Corp., York, Pa.


shank AMMONIA VALVES AND REFRIGERATION PRODUCTS



SEMI-STEEL SHUT-OFF VALVE

Highest grade non-porous metal—full size ports—clean cut threads. Back seated stem — Shank design base—perfect alignment. Long life packing ring.



ALL-STEEL GAUGE SETS

All-Steel Construction. Automatic shut-off of liquid in case of glass breakage. Composition packing rings give long life, no-leak seal.

If your jobber doesn't stock—write

CYRUS SHANK CO.
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POLAR PETE Says: "Cut Maintenance Costs with the Best Corkboard Made!"

Sizes 12" x 36", 24" x 36" in Any Thickness

BUY CORKBOARD — MADE WHERE CORK IS GROWN

"B.C.M." Steambaked corkboard is manufactured in the principal cork producing areas from the finest cork available. Standards for the manufacture of "B.C.M." corkboard guarantee uniformity and will meet all specifications. Conductivity is K = 0.26 . . . This low conductivity factor together with the high structural stability, vapor sealing nature and extraordinarily long life makes "B.C.M." corkboard your most economical insulation.

Deliveries in any quantities are promptly made from stocks in principal U.S.A. areas.

Write today for quotations and samples — you'll find it worth your while.

B.C.M. CORK COMPANY, INC.
25 BROADWAY • NEW YORK

BOWER

B B BRAND

AMMONIA

Purity of product and immediate shipment are two good reasons for specifying Bower Brand. Please keep empty cylinder rotating.

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29TH AND GRAY'S FERRY ROAD

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Pipe Coils

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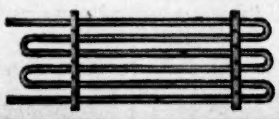
For Refrigeration, Air Conditioning, Heating

Coils and Bends of any Metal, Size or Design. Engineered to your requirements. Designed and built for longest life and the least maintenance.

Send your problems to us for engineering assistance.



REMPE CO.

REMPE COMPANY

348 N. Sacramento Blvd., Chicago 12, Ill.


# THE BUYERS

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**BRINE SPRAY COOLING**
Acme Industries, Inc., Jackson, Mich.
Frick Co., Waynesboro, Pa.

**BRINE TREATMENT**
International Salt Co., Inc., Scranton, Pa.

**CALCIUM CHLORIDE**
Solvay Process Div., The Allied Chemical & Dye Corp., New York, N. Y.

**CAN DUMPS**
Frick Co., Waynesboro, Pa.
Gifford-Wood Co., Hudson, N. Y.
Ohio Galvanizing & Mfg. Co., Niles, Ohio
Reynolds Mfg. Co., Springfield, Mo.
Vogt Machine Co., Henry, Louisville, Ky.
York Corp., York, Pa.

**CANVAS COVERS**
Vivian Mfg. Co., St. Louis, Mo.

**CAR ICING EQUIPMENT**
Gifford-Wood Co., Hudson, N. Y.
Lilly Co., The, Memphis, Tenn.
Tri-Pak Machinery Service Inc., Harlingen, Tex.

**COILS**
Acme Industries, Inc., Jackson, Mich.
Byers Co., A. M., Pittsburgh, Pa.
Chicago Nipple Mfg. Co., Chicago, Ill.
Creamery Package Mfg. Co., Chicago, Ill.
Detroit Ice Machine Co., Detroit, Mich.
Howe Ice Machine Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Vogt Machine Co., Henry, Louisville, Ky.
York Corp., York, Pa.

**COLD STORAGE CONSTRUCTION**
Armstrong Cork Co., Lancaster, Pa
"B.C.M." Cork Co., New York, N.Y.
Frick Co., Waynesboro, Pa.

**COLD STORAGE DOORS**
Butcher Boy Refrigerator Door Co., Harvard, Ill.
Jamison Cold Stge. Door Co., Hagerstown, Md.
Refrigeration Engineering Co., Montgomery, Minn.

**COMPRESSORS**
(See Ice Making and Refrigerating Machinery)

**COMPRESSOR VALVE PLATES AND DISCS**
Voss, Inc., J. H. H.. New York, N.Y.

**COMPRESSOR VALVES**
Voss, Inc., J. H. H., New York, N.Y.

**CONDENSERS**
Acme Industries, Inc., Jackson, Mich.
Creamery Package Mfg. Co., Chicago, Ill.
Enterprise Equipment Corp., Yonkers, N. Y.
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Frick Co., Waynesboro, Pa.
Howe Ice Machine Co., Chicago, Ill.
King-Zeero Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Reynolds Mfg. Co., Springfield, Mo.
Vogt Machine Co., Henry, Louisville, Ky.
York Corp., York, Pa.

**CONSULTING ENGINEERS**
Greene, Van R. H., New York, N. Y.
Ophuls & Associates, Fred, New York, N. Y.

**CONTROLLING INSTRUMENTS**
Kramer Trenton Co., Trenton, N.J.
Taylor Instrument Cos., Rochester, N. Y.

**CONVEYORS**
Gifford-Wood Co., Hudson, N. Y.
Lilly Co., The, Memphis, Tenn.

**COOLING TOWERS**
Frick Co., Waynesboro, Pa.

**CORK INSULATION**
Armstrong Cork Co., Lancaster, Pa
"B.C.M." Cork Co., New York, N.Y.
United Cork Companies, Kearny, N.J.

**CORROSION CONTROL**
Wright Chemical Corp., Chicago, Ill.

**COUPON BOOKS**
Index Coupon & Supply Co., La Porte, Ind.
Vivian Mfg. Co., St. Louis, Mo.

**COVERINGS (PIPE AND BOILERS)**
Armstrong Cork Co., Lancaster, Pa
MMM, Inc., Houston, Texas

**CYLINDERS (GAS & LIQUID)**
Byers Co., A. M., Pittsburgh, Pa.

**DIESEL ENGINES**
Caterpillar Tractor Co., Peoria, Ill.

**DIP TANKS AND CAN BASKETS**
Frick Co., Waynesboro, Pa.
Knickerbocker Stamping Co., Parkersburg, W. Va.
Ohio Galvanizing & Mfg. Co., Niles, Ohio
Vogt Machine Co., Henry, Louisville, Ky.

**DRIVES, TRANSMISSIONS**
Frick Company, Waynesboro, Pa.

**ELEVATING & CONVEYING MACHINERY**
Gifford-Wood Co., Hudson, N. Y.
Lewis-Shepard Products, Inc., Watertown, Mass.
Lilly Co., The, Memphis, Tenn.

**ENGINEERS AND ARCHITECTS**
(See Architects and Engineers)

**ENGINES**
Caterpillar Tractor Co., Peoria, Ill.

**EVAPORATIVE CONDENSERS**
Niagara Blower Co., New York, N. Y.

**EVAPORATORS**
Acme Industries, Inc., Jackson, Mich.
Creamery Package Mfg. Co., Chicago, Ill.
Frick Co., Waynesboro, Pa.
Niagara Blower Co., New York, N. Y.
Vogt Machine Co., Henry, Louisville, Ky.
York Corp., York, Pa.

**FEED-WATER HEATERS**
National Pipe Bending Co., New Haven, Conn.
Vogt Machine Co., Henry, Louisville, Ky.

# DIRECTORY

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**FIBERGLAS**
Armstrong Cork Co., Lancaster, Pa.

**FIELD ICE SAWS**
Gifford-Wood Co., Hudson, N. Y.

**FILTERS, WATER**
Frick Co., Waynesboro, Pa.
York Corp., York, Pa.

**FIN COILS**
Acme Industries, Inc., Jackson, Mich.
Howe Ice Machine Co., Chicago, Ill.
York Corp., York, Pa.

**FIRST AID SUPPLIES**
Acme Protection Equipment Co., Chicago, Ill.

**FITTINGS**
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Frick Co., Waynesboro, Pa.
Henry Valve Co., Chicago, Ill.
Vogt Machine Co., Henry, Louisville, Ky.

**FLOAT VALVES**
Mojonnier Bros. Co., Chicago, Ill.

**FLOOR PATCHING**
Permamix Corp., Chicago, Ill.

**FOOD FREEZING EQUIPMENT**
Howe Ice Machine Co., Chicago, Ill.

**FROZEN FOOD LOCKERS**
Knickerbocker Stamping Co., Parkersburg, W. Va.

**FUEL OIL PRE-HEATERS**
National Pipe Bending Co., New Haven, Conn.

**GAS & OIL ENGINES**
Caterpillar Tractor Co., Peoria, Ill.

**HAND TRUCKS**
Ohio Galvanizing & Mfg. Co., Niles, Ohio

**HOISTING APPARATUS**
Reynolds Mfg. Co., Springfield, Mo.

**HUMIDITY AIR CONDITIONERS**
Niagara Blower Co., New York, N. Y.

**HYGROMETERS**
Taylor Instrument Cos., Rochester, N. Y.

**ICE BAGS**
Union Bag & Paper Corp., New York, N. Y.
Vivian Mfg. Co., St. Louis, Mo.

**ICE BLOWERS**
Gifford-Wood Co., Hudson, N. Y.

**ICE CANS**
Ice plant Equipment Co., Inc., Philadelphia, Pa.
Knickerbocker Stamping Co., Parkersburg, W. Va.
Ohio Galvanizing & Mfg. Co., Niles, Ohio

**ICE CAN FILLERS**
Frick Co., Waynesboro, Pa.
Knickerbocker Stamping Co., Parkersburg, W. Va.
Ohio Galvanizing & Mfg. Co., Niles, Ohio
Vogt Machine Co., Henry, Louisville, Ky.

**ICE CARVINGS**
Ice Carvings Co., Hollywood, Calif.

**ICE CHIPPERS**
Gifford-Wood Co., Hudson, N. Y.
Index Coupon & Supply Co., La Porte, Ind.
Vivian Mfg. Co., St. Louis, Mo.

**ICE CHUTES**
Frick Co., Waynesboro, Pa.
Gifford-Wood Co., Hudson, N. Y.
Jamison Cold Storage Door Co., Hagerstown, Md.

**ICE CONVEYORS**
Gifford-Wood Co., Hudson, N. Y.
Lilly Co., The, Memphis, Tenn.
Refrigeration Engineering Co., Montgomery, Minn.

**ICE CREAM PLANTS**
Frick Co., Waynesboro, Pa.

**ICE CRUSHERS**
Bateman Foundry & Machine Co. Inc., Mineral Wells, Texas
Gifford-Wood Co., Hudson, N. Y.
Index Coupon & Supply Co., La Porte, Ind.
Lilly Co., The, Memphis, Tenn.
Micron, Inc., Bettendorf, Iowa
Tri-Pak Machinery Service Inc., Harlingen, Tex.
Vivian Mfg. Co., St. Louis, Mo.

**ICE CUBE CONTAINERS**
Index Coupon & Supply Co., La Porte, Ind.
Lilly Co., The, Memphis, Tenn.
Union Bag & Paper Co., New York, N. Y.
Vivian Mfg. Co., St. Louis, Mo.

**ICE CUBERS**
Ice plant Equipment Co., Inc., Philadelphia, Pa.
Vivian Mfg. Co., St. Louis, Mo.

**ICE CUBING MACHINES**
Gifford-Wood Co., Hudson, N. Y.
Ice Plant Equipment Co., Inc. Philadelphia, Pa.
Lilly Co., The, Memphis, Tenn.

**ICE DELIVERY BAGS**
Gifford-Wood Co., Hudson, N. Y.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Index Coupon & Supply Co., La Porte, Ind.
Lilly Co., The, Memphis, Tenn.
Union Bag & Paper Corp., New York, N. Y.
Vivian Mfg. Co., St. Louis, Mo.

**ICE HARVESTING MACHINERY & TOOLS**
Gifford-Wood Co., Hudson, N. Y.

**ICE MAKING AND REFRIGERATING MACHINERY**
Carrier Corp., Syracuse, N. Y.
Creamery Package Mfg. Co., Chicago, Ill.
Dersch, Gesswein & Neuert, Inc., Chicago, Ill.
Detroit Ice Machine Co., Detroit, Mich.
Enterprise Equipment Corp., Yonkers, N. Y.
Frick Company, Waynesboro, Pa.
Howe Ice Machine Co., Chicago, Ill.
Ice plant Equipment Co., Inc., Philadelphia, Pa.
Reynolds Mfg. Co., Springfield, Mo.
Vogt Machine Co., Henry, Louisville, Ky.
York Corp., York, Pa.

**If you hear *BELLS* ringing...**

they're probably ice company cash registers ringing up profits from this "Birthday-Anniversary Arch" and many other unique, glamorous

**ICE CARVINGS and ICE PUNCH BOWLS**

Some ice companies hesitated over the revolutionary idea of merchandising Ice Carvings and Ice Punch Bowls—a complete service—to hotels, restaurants, clubs, weddings and parties.

Actually they found it simple and easy . . . using their regular facilities plus our supplies and merchandising program. Buyers cold to ice were warmly enthusiastic about Ice Carvings and Ice Punch Bowls. This is, of course, advertising with a solid punch . . . and the music of extra profits, real profits, sounds awfully good. It will for you, too! Find out about it TODAY. Write, wire or phone:

**ICE CARVINGS CO.**
1146 North Las Palmas Hollywood 38, California
Telephone: Hollywood 9-5057

*EVER SLIPPED YOUR DISC?*

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WOLF-LINDE Bolted Bonnet Valves are all designed with the valve disc held to the stem by a positive locking pin rather than by threads, thus making it impossible for the disc to become unscrewed and prevent operation of the valve.

WOLF-LINDE integrity of design assures you of the best valves that money can buy.

WOLF-LINDE valves installed in 1890 are still going strong.

*Ask for a FREE* **WOLF-LINDE** *Catalog.*

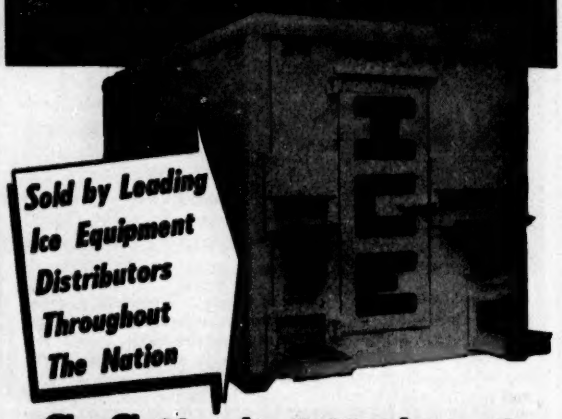
DERSCH, GESSWEIN & NEUERT, INC.
4849 W. Grand Ave., Chicago 39, Ill.

SERVING THE ICE INDUSTRY FOR 20 YEARS

*Dependable . Automatic . Refrigerated*

**S&S ICE VENDING STATIONS**

**AND ICE VENDING EQUIPMENT**




**S&S Vending Machine Co.**

670 LINCOLN AVE., SAN JOSE, CALIFORNIA

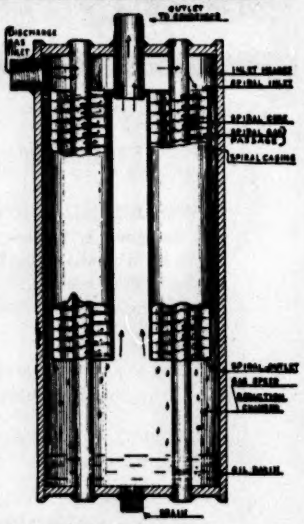
**"King Zeero"**

**OIL SEPARATOR**

**STOPS OIL FROM ENTERING CONDENSER RECEIVER AND LOW SIDE**

**Allows operation as was originally intended. Simple in operation — no parts to wear out — no screens, metal wool or any close screens to clog, raise discharge pressures and cut down capacity.**

**When used in connection with air compressors, water is also separated with the oil.**




***Built for years of trouble free service. Mechanical details on request.***

THE KING ZEERO COMPANY

General Office and Plant No. 1 1847-55 W. Montrose Ave. Chicago 13, Ill.

Plant No. 2 4100-14 W. Montrose Ave. Chicago 41, Ill.

# THE BUYERS

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**ICE PICKS AND PLANERS**
Gifford-Wood Co., Hudson, N. Y.
Index Coupon & Supply Co., La Porte, Ind.
Lilly Co., The, Memphis, Tenn.
Vivian Mfg. Co., St. Louis, Mo.

**ICE PICK SCABBARDS**
Gifford-Wood Co., Hudson, N. Y.
Index Coupon & Supply Co., La Porte, Ind.
Lilly Co., The, Memphis, Tenn.
Vivian Mfg. Co., St. Louis, Mo.

**ICE PLANTS**
Enterprise Equipment Corp., Yonkers, N. Y.

**ICE SCALES**
Conveyor Co., The, Los Angeles, Calif.
Gifford-Wood Co., Hudson, N. Y.
Index Coupon & Supply Co., La Porte, Ind.
Lilly Co., The, Memphis, Tenn.
Vivian Mfg. Co., St. Louis, Mo.

**ICE TOOLS**
Gifford-Wood Co., Hudson, N. Y.
Ice Plant Equipment Co., Inc., Philadelphia, Pa.
Index Coupon & Supply Co., La Porte, Ind.
Lilly Co., The, Memphis, Tenn.
Vivian Mfg. Co., St. Louis, Mo.

**ICE VENDING KITS**
Ballard Sales Co., Ft. Worth, Tex.
Refrigeration Engineering Co., Montgomery, Minn.

**ICE VENDORS**
Frick Company, Waynesboro, Pa.
Jamison Cold Storage Door Co., Hagerstown, Md.
Refrigeration Engineering Co., Montgomery, Minn.
S & S Vending Machine Co., San Jose, Calif.
Vivian Mfg. Co., St. Louis, Mo.

**INDICATING INSTRUMENTS**
Taylor Instrument Cos., Rochester, N. Y.

**INSTANTANEOUS HEATERS**
National Pipe Bending Co., New Haven, Conn.

**INSULATING MATERIALS**
Armstrong Cork Co., Lancaster, Pa.
"B.C.M." Cork Co., New York, N.Y.
MMM, Inc., Houston, Texas
Pacific Lumber Co., San Francisco, Calif.
United Cork Companies, Kearny, N.J.

**INSULATION ADHESIVES**
American Bitumuls & Asphalt Co. San Francisco, Calif.

**LIFT TRUCKS**
Lewis-Shepard Products, Inc., Watertown, Mass.

**LOW TEMPERATURE EQUIPMENT**
(See Ice Making and Refrigerating Machinery)

**MAGNETIC FLOAT SWITCHES**
Mojonnier Bros. Co., Chicago, Ill.

**MASKS, AMMONIA**
Acme Protection Equipment Co., Chicago, Ill.

**MATERIALS HANDLING EQUIPMENT**
Ohio Galvanizing & Mfg. Co., Niles, Ohio

**OIL AND LUBRICANTS**
Sun Oil Co., Philadelphia, Pa.
Texas Co., The, New York, N. Y.

**OIL SEPARATORS**
King-Zeero Co., Chicago, Ill.
Rex Engineering & Sales Co., Oklahoma City, Okla.

**OILS, CUTTING**
Sun Oil Co., Philadelphia, Pa.
Texas Co., The, New York, N. Y.

**OILS, FUEL**
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Texas Co., The, New York, N. Y.

**PACKINGS**
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Vivian Mfg. Co., St. Louis, Mo.
York Corp., York, Pa.

**PIPE COILS AND BENDS**
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Chicago Nipple Mfg. Co., Chicago, Ill.
Frick Company, Waynesboro, Pa.
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Vogt Machine Co., Henry, Louisville, Ky.
York Corp., York, Pa.

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**PRESSURE REGULATORS**
Taylor Instrument Cos., Rochester, N. Y.

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Layne & Bowler, Inc., Memphis, Tenn.
Roots-Connersville Blower Corp., Connersville, Ind.

**PUMPING MACHINERY— AIR LIFT**
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**PUMPS, AMMONIA AND BRINE**
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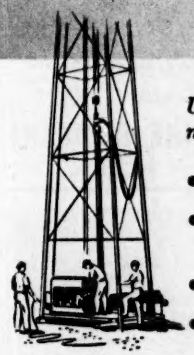

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- **Surveys and test wells**
- **Analyses and recommendations**
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- **Installation and maintenance**

For information on any phase of water supply or pump equipment, contact your nearest Layne Associate Company or write Layne & Bowler, Inc., Memphis 8, Tenn.

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**Canvas Bags** — **Ice Picks**
**Ice Crushers** — **Small Tools**

**FAST SERVICE**
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**LOW PRICES**

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**ORDER TODAY — NOW ! ! !**
**LaPorte, Indiana**

**DIMCO CAST ALUMINUM FIN EVAPORATING COIL**

★ *Saves Space*

★ *Saves Weight*

★ *Saves Cost*

CAN BE USED WITH ANY REFRIGERANT

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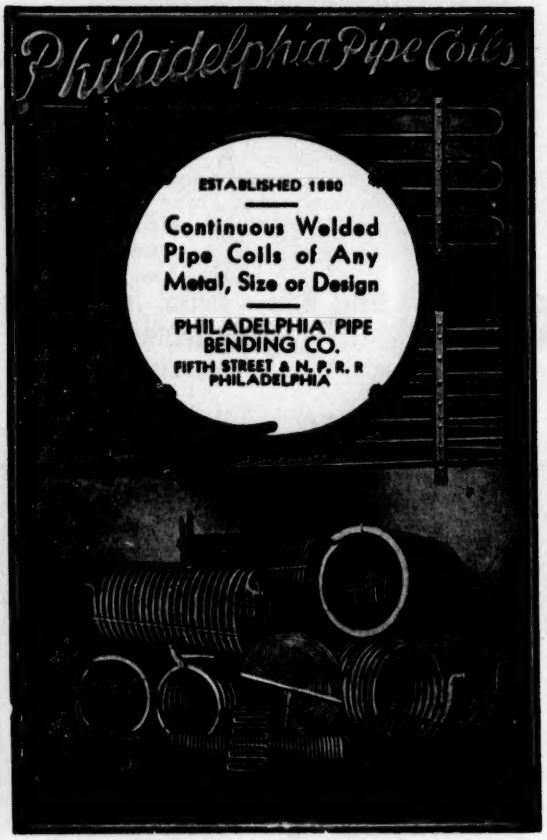
2615 Twelfth St., Detroit 16, Mich.

DIMCO Evaporators in a Frozen Food Storage Room at Great Lakes Terminal Warehouse, Toledo, Ohio. A typical installation facilitating palletizing.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- Diamond Point Picks
- Easy Starting Briggs & Stratton Engine

Model WP-76

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COMPLETE PLANT DESIGNS INCLUDING BUILDING AND EQUIPMENT

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**For Reliability and Economy**

For long-time, dependable performance, always insist upon R-C Rotary Positive Blowers for new equipment or replacements. Send for Bulletin 21-B-37.

**ROOTS-CONNERSVILLE BLOWER**

**PACKING HOUSE**

*Saves Time, Trouble, Money*

**WITH NEW STERLING KOOLER KUBES***

*Trademark International Salt Company, Inc.

*"How good are Kooler Kubes?* It used to take one man five to six hours per day to service our cooler units with salt. Now the same man services the same units in 2 hours 20 minutes with Kooler Kubes.

"And we are saving money on salt because Kooler Kubes do a better job.

"Along with this, we have not had to clean out a single unit in three months. We used to spend two hours per week per unit cleaning out the units and sprays."

Marhoefer Div. of Kuhner Packing Co.
*Muncie, Indiana*

Kooler Kubes are special, heavily compressed 50-lb. refrigeration salt cubes for unit coolers, brine spray cold diffusers, spray deck systems.

**INTERNATIONAL SALT COMPANY, INC.**
Scranton 2, Pennsylvania

☐ Please have a representative call.

☐ Please send additional information.

*Signed:*

NAME_____

COMPANY_____

ADDRESS_____

CITY_____

ZONE_____ STATE_____

**For Additional Information Send Coupon Now**

# Classified Advertising

All classified advertisements are payable in advance. Except for Positions and Help Wanted classifications, this section is reserved exclusively for USED equipment.

RATES: $4.00 for 30 words or less; 7¢ for each additional 10 words or fraction thereof; $1 per line for bold face headings; $10.00 per inch for line listings.

## POSITIONS AND HELP WANTED

WANTED—Operating refrigeration engineer capable of taking charge of 100 ton ice plant. Steady employment. Located in Western New York state. State experience and qualifications in reply. Address Box MR-16, Ice and Refrigeration, 435 N. Waller Ave., Chicago 44.

## ICE PLANTS—for sale

FOR SALE—18 ton ice plant complete, ground and building, or will sell all equipment, to be moved, buyer to dismantle. Memphis Ice Co., W. E. Wilsey, Memphis, Missouri, Phone 5751.

FOR SALE—Complete ice plant consisting of Superior Diesel with generator operating 10x10 ice machine, lids, cans, hoist, scoring machine, water treatment equipment with tank, also 25T shell and tube, cooler complete with agitator and accumulator. All A-1 condition. Home City Ice Co., Ivanhoe Ave., Cincinnati 33, Ohio.

**FOR SALE**

**FRICK ICE PLANT—6 YRS. OLD**
**130 TON CAPACITY COMPLETE**

Including following items:

2—10x10 Frick ammonia compressors.
1—Vilter 6½x6½ compressor.
1—Frick agitator assembly.
1—Large and 1 small Root Blowers.
350—Ice cans 11x22x9 new and welded.
595—Ice cans 11½x22½x46 riveted.
1—2-ton Shepard Niles Hoist, electrical. 3-way travel for 12" track and 40 ft. span.

**ROLLING MILL SCRAP, INC.**
802 S. Waugh St. Kokomo, Ind.
Phone 6134

FOR SALE—one 50-ton electric ice plant consisting of the following equipment; one 10x10 York compressor direct connected to 75 h.p. motor; one 12x12 Frick direct connected to 125 h.p. motor; one 5-can (electric) Euclid hoist, 2 ton; 600 ice cans baskets of 5; 14,520 ft. 1¼" ammonia coils. Plus other miscellaneous equipment. Southwestern Oklahoma. W. H. Youse, 714 W. 4th St., Tulsa, Okla.

**FOR SALE**
**USED ICE PLANTS AND REFRIGERATING EQUIPMENT**
Complete ice plants—10-50 ton.
Ammonia compressors—all sizes.
Valves and fittings.
Condensers, brine coolers, ice cans.
**B & E REFRIGERATING CO.**
**2 ORANGE ST., NEWARK 2, N. J.**
Phone: Mitchell 3-7790 Cable address "BERECO"

## USED EQUIPMENT-wanted & for sale

FOR SALE—one 252 can, 300 lb. York ice tank with agitator, dump and filler, 2 can electric hoist, water filter, air blower and air compressor. Practically new. Meadow Gold Products Co., 1357 D St. S.E., Washington 3, D. C.

WANTED—Used 4 can unit ice dump, 4 can unit ice filler, and 4 can overhead traveling crane complete with motor, A.C., 220 voltage. Miami Crystal Ice & Cold Storage Co., 1100-1140 N.W. 21st Terrace, Miami, Florida.

FOR SALE—ICE CANS. 112 new 11x22x47 inch high pressure cans $8.50 each; 89 used 11x22x47 H.P. cans $3.00 each; and 100 used 11½x22½x44 inch low pressure cans $3.00 each (all F.O.B. Dyersburg, Tennessee). Contact Wilson Fly, P.O. Box 5506, Memphis, Tenn. Phone 36-6313.

FOR SALE—1—Roots-Connersville Blower, 5 h.p.; 1—brine agitator; 1—Type F-2 Gifford-Wood scoring machine for 300-lb. ice cakes; 1—3-can ice can filler; 1—3-can ice can dump; 1—7½x7½ York ice compressor; 1—9x9 Frick ice compressor; 1—1946 Ford truck with McCabe-Powers body. All in good condition. Ashland Ice & Coal Co., Ashland, Ohio. Phone 29511.

**FOR SALE—COMPLETE ICE MAKING PLANTS**

60 ton—14 can pull; 35 ton, Diesel drive—6 can pull; 25 ton, 5 can pull.

AMMONIA COMPRESSORS

1—12½x14½ York, ½ & ¾ capacity control.
2—10x10 Yorks, 4100 volt, 300 r.p.m. motors.
2—6½x6½ Yorks high speed.
1—6x6 York high speed.
1—4x4 York self-contained unit.
1—11½x8 Frick Booster Compressor, v-belt drive to 50 hp. motor.
1—5¾x4 Frick Booster Compressor, v-belt drive to 10 hp. motor.

MISCELLANEOUS EQUIPMENT

130 h.p. 3 cylinder Superior Diesel engine, 600 r.p.m.
75 h.p. motor. 730 r.p.m.—30 h.p. motor, 860 r.p.m.
15 h.p. water pump, 7½ & 10 h.p. centrifugal blowers, scoring machines, ice cans, agitators, etc.

**JOHN F. CARSON**
"A" & Venango Sts. Philadelphia 34, Pa.
Phone Garfield 6-2221

**FOR SALE**

1—60 ton evaporator condenser complete with 7½ h.p. fan motor & 1 h.p. water pump.
1—6½x6½ Vilter ammonia compressor, 3 yrs. old.
2—6x6 Harris ammonia compressors, one recently overhauled.
1—3 phase motor, 30 h.p. G.E. Triclad, new.
2—G.E. 20 h.p. motors, used.
Must be sold before May 1st. Will accept a reasonable offer.

**WASHINGTON SECURITIES CO.**
Securities Bldg. Seattle 1, Wash.

## USED EQUIPMENT—continued

**FOR SALE—NEW ICE PLANT SUPPLIES**

21 ice cans 11x22x49; 1½ h.p. vertical agitator motor; gaskets and shaft packing for York 5x5; 11 Gates V-belts No. 130 B; drop tubes and fittings; thawing needle valve and stems; other items. All new. Cheap. Write John S. Painter, Ironton, Mo.

FOR SALE—Frick Sharp Freezer. Installed in 1946. Sharp freezing capacity approximately 1000 lbs. per hour. Can construct large room and use as a storage and/or sharp freezer. Can be installed as a tunnel, individual truck, or shelf type unit. Palco wool insulation and automatic float valves goes with unit. Equipment is located at our plant in Lebanon, Pa. Write or phone 2-4687, Chas. T. Corkran, 9th & Water Sts., Lebanon, Pa.

**FOR SALE**
**MISCELLANEOUS ICE PLANT EQUIPMENT**

1—60 h.p. Century motor, 2200 volt.
1—40 h.p. Century motor, 2200 volt.
2—Westinghouse magnetic starters.
2—Vertical direct connected agitators, 3 h.p.
1—Hoffman blower.
2—60 KVA condensers or capacitors.
1—2-can Euclid hoist, 1 ton.
1—2-can Euclid hoist, ½ ton.
1—12"x36½' channel with trolleys "Curtis".
1—Cook 8-inch, 5-stage turbine deep well pump 5 h.p.
1—Cook 7⅝" 10-stage turbine deep well pump 7½ h.p.
1—Meir crane mover.
200—400-lb. ice cans, like new, (Ohio), 11½x22½x57, in brine.
220—White oak dual covers for ice tank, 400 lb.
1—Miller ice scoring machine for 400 lb. blocks.
1—Perfection ice scoring machine, 400 lb. blocks.
1—Gifford Wood tiering machine—8 tier.

**WHITE FROST ICE CO., INC.**
525 W. 8th St. Anderson, Indiana
Phone 7702

FOR SALE—3x3 and 5x5 self-contained Yorks. 3x3, 5x5, 6x6, 7½x7½, 8x8 and 9x9 Yorks, splash lubrication. One 2-ton Niagara Ammonia Blower unit. Receivers, all sizes. Write E. Niebling, 1546 St. Clair, Mt. Healthy, Cincinnati 31, Ohio.

FOR SALE—4½x5 Baker self-contained unit. 6x6 Frick, with 15 hp. motor and vee belts. 9x9 York, slow speed. 7½x7½ York with 40 hp. synchronous motor. 9x9 Frick, direct connected to Ideal synchonous motor. 12x12 with synchronous motor, iec cans, condensers, brine coolers, agitators, blowers, ice scoring machine, electric cranes, complete plants. Parke Pettegrew & Son Company, 370 West Broad St., Columbus 8, Ohio.

**FOR SALE — USED ICE PLANTS AND REFRIGERATING EQUIPMENT**

2—90 ton York Evaporative Condensers
20 ton Ice Plant, 252 300-lb. Cans, Diesel drive compressor
30 ton Ice Plant, 368 300-lb. Cans, 8 can pull, Electric driven
40 ton Ice Plant, 552 300-lb. Cans, 6 can pull, Diesel driven
60 ton Ice Plant 840 300-lb. Cans, 24 can pull, Diesel driven.
130 ton Ice Plant, 1,378 300-lb. Cans, 26 can pull, Electric driven
10,000 11" x 22" x 47" 300-lb. Ice Cans, Excellent Condition
2,500 11" x 22" x 51" 300-lb. Ice Cans, Excellent Condition
Ammonia Compressors 3" x 3" to 12½" x 14½"
Shell & Tube Ammonia Condensers, Brine Coolers, Receivers, Traps, Valves & Fittings
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Ice Making and Refrigeration - Industrial Power Plants
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COLD STORAGE PIPE SCRAPERS
**VIVIAN MANUFACTURING COMPANY**
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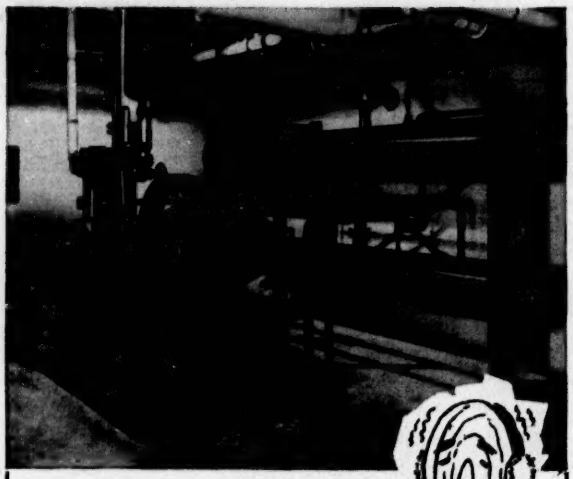

**HOW COLD IS AN OYSTER?**

It all depends on what's being done to him. On shipboard he's kept at bed water temperature, he's quick-frozen at minus 20 F., and held in storage at minus 10 to 12 F. The *exact* temperature is all-important to keep him in top-profit condition.

Whatever your product, or temperature requirement, HOWE engineers have the know-how to solve your particular refrigeration problem. Through HOWE'S job-proved economies, you can cut operating and maintenance costs to a minimum. HOWE Compressors have interchangeable parts . . . a money-saving advantage. Whether you need a new plant, or must re-design your old one, HOWE can do it for you economically . . . *exactly!*

**41 YEARS OF SPECIALIZATION INSURE SAVINGS**

Since 1912, manufacturers of ammonia compressors, condensers, coolers, fin coils, locker freezing units, air conditioning (cooling) equipment.

*Write for literature*

**HOWE ICE MACHINE CO.**

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*Distributors in Principle Cities • Cable Address: HIMCO, Chicago*

**HOWE POLAR CIRCLE COILS** produce 6-way savings! Built for heavy duty in meat packing, ice cream, quick freezing, ice and cold storage plants. Provide improved refrigeration that assures better product control. Write for details.

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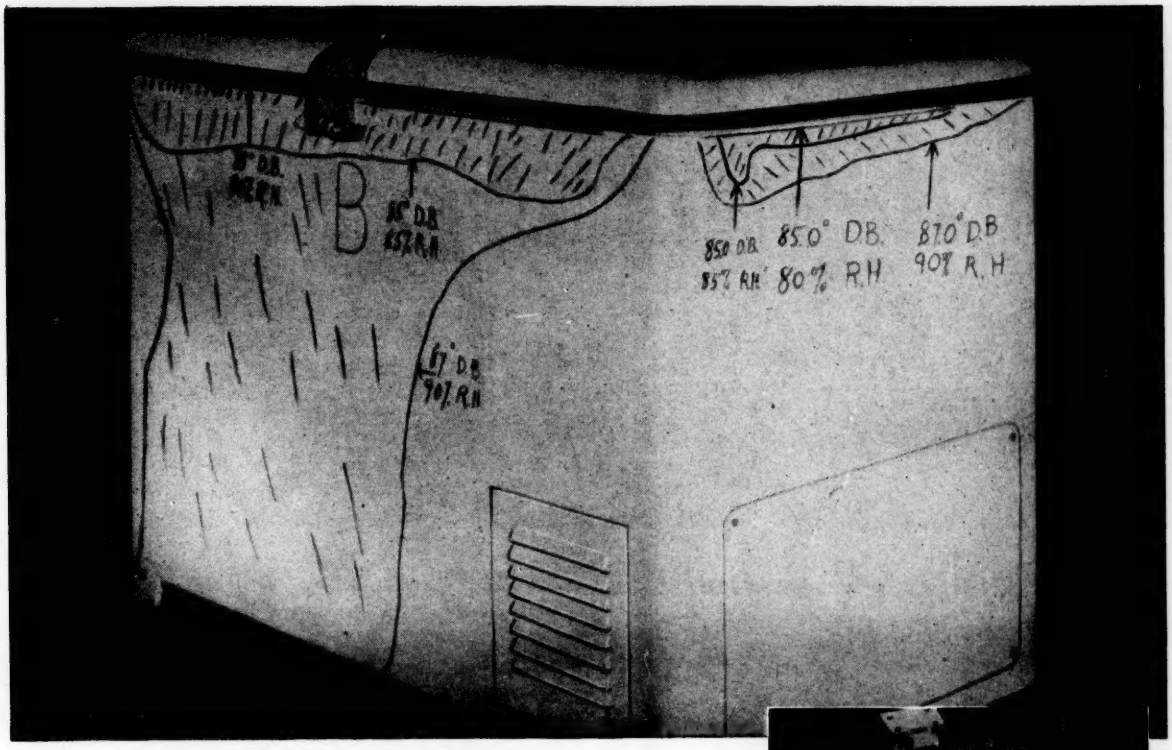



# "SWEAT PATTERN" TESTS REVEAL HIDDEN WEAKNESS

Performance shortcomings can develop in even the best designed low-temperature equipment. You can guard against potential trouble by finding its causes before you put new models into production. Just send your pilot models to Armstrong for a Life Test.

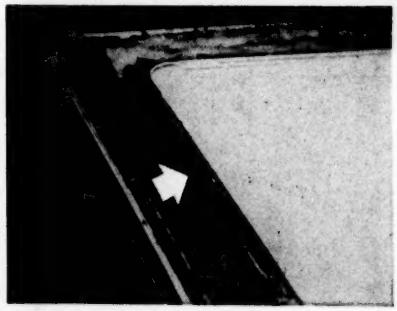
In completely new, accurately controlled test rooms, Armstrong can duplicate in about ten weeks many years of actual equipment service. During the tests, sweat patterns like those shown above develop, indicating hidden weaknesses or minor defects. At the end of these tests, manufacturer's engineers and Armstrong laboratory specialists take the model apart piece by piece, decide what should be done to correct the defects.

Like much of the equipment we test, the sweat patterns on the freezer pictured here indicated good design. Excessive condensation occurred at only two points and was caused by improper fitting of insulation. The trouble was easy to remedy on the production line. Discovery of a weakness that might have resulted in customer complaints made the test worth while for this manufacturer.

Armstrong will conduct similar tests for you. You may send in as many test models as you wish, provided one of the group is insulated with one of the three insulating materials sold by Armstrong – LK® Corkboard, Fiberglas, or Temlok®. To arrange a test, call the Armstrong office nearest you or write directly to Armstrong Cork Company, 4504 Queen Street, Lancaster, Pennsylvania.

*® OCFCorp.

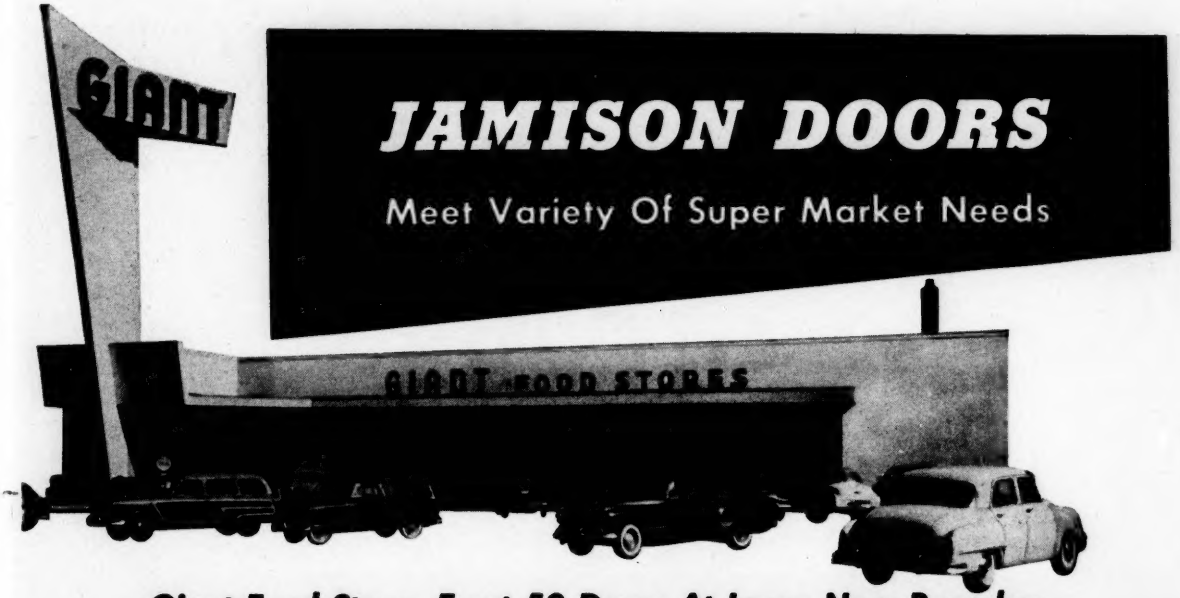
**Trouble-Spot #1.** Arrow shows where side wall insulation batts did not meet at corner. A through space remained which allowed outer shell to cool, causing condensation.



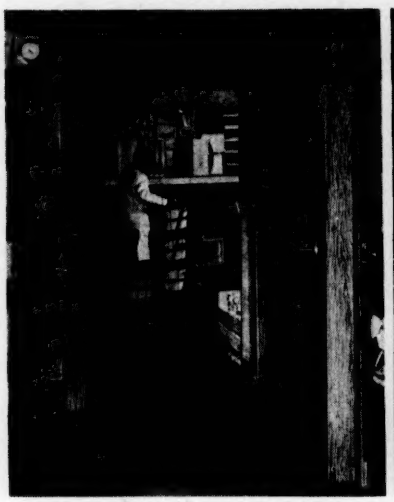
**Trouble-Spot #2.** Arrow shows where insulation was a little short in the side walls and did not fit snugly under the breaker strip, resulting in condensation on the exterior.

## ARMSTRONG'S EQUIPMENT INSULATION

LK CORKBOARD • FIBERGLAS • TEMLOK

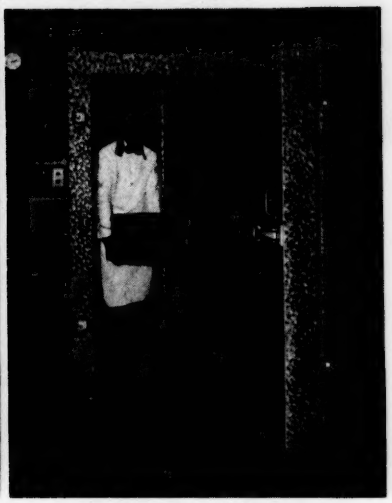



## *Giant Food Stores Erect 50 Doors At Large New Branches*



*Jamison Standard Walk-In Door*

*Jamison Standard Track Door*



*Lo-Temp Vestibule Door*

The Giant Food Stores always have been alert to the need for the best in food protection and modern cold storage methods. For this reason this food market chain chose Jamison Cold Storage Doors for 10 of its large new stores.

Five doors for three different purposes were installed at each super market. At the Giant Food Store in Washington, D. C., there are two Jamison Standard walk-in doors for fruit and produce storage, two Jamison Standard track doors for meat storage, and one Lo-Temp vestibule door for frozen food storage.

These Jamison Doors, built for hard usage, provide maximum protection for refrigerated meats, fruits, and frozen foods.

More and more markets are turning to Jamison for economical, trouble-free protection because they know Jamison products meet their requirements with maximum efficiency. Write for Catalog No. 1. Jamison Cold Storage Door Co., Hagerstown, Md., U.S.A.

**JAMISON**

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